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FOOD TECHNOLOGY ABSTRACTS

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**National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India**

Compiled and Edited by

B. Vasu

C. S. Anita

Geetha Seetharam

Abstractors to FTA

AS	Author's Summary
BV	B. Vasu
CSA	C. S. Anita
GS	Geetha Seetharam
KAR	K. A. Ranganath
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan
VKR	V. Krishnaswamy Rao

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

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ABBREVIATIONS

A	ampere	g	gram	qt	quart
AAS	atomic absorption Spectrometry	GC	gas chromatography	R	rontgen
abstr.	abstract	gn	gravity	rad	rad or radian
ad lib.	ad libitum	gal	gallon	ref.	reference(s)
ADP	adenosine diphosphate	gf	gram-force	rev/min	revolutions per minute
Anon.	Anonymous	GLC	gas-liquid chromatography	RH	relative humidity
AOAC	Association of Official Analytical Chemists	h	hour	RNA	ribonucleic acid(s)
approx.	approximately	ha	hectare	S.	south, Southern, etc.
atm	atmosphere	HDPE	high density polyethylene	s.d.	standard deviation
ATP	adenosine triphosphate	hL	hectolitre [100 l]	SDS	sodium dedecylsulphate
a _w	water activity	hp	horse power	s.e.	standard error
BHA	butylated hydroxyanisole	HPLC	high	s	second [time]
BHT	butylated hydroxytoluene	HTST	performance/pressure liquid chromatography	SNF	solids-not-fat
BOD	biological oxygen demand	Hz	high temperature short time	sp., spp.	species
b.p.	boiling point	in	hertz [frequency cycle/s]	sp.gr.	specific gravity
Btu	British thermal unit	IR	inch	summ.	summary
c-	centi- [as in cm, cm ² , cm ³]	IU	infrared	Suppl.	Supplement
cal	calorie	J	international unit	t	metric tonne
cd	candela	k-	joule	temp.	temperature
Cl	curie	K	kilo- [as in kcal, kg]	TLC	thin layer
CMC	carboxymethyl cellulose	lb	Kelvin	TS	chromatography
COD	chemical oxygen demand	lb	pound	UHT	total solids
coeff.	coefficient	LDPE	pound-force	UV	ultra-high temperature
conc.	concentrated	m-	low density	V	ultraviolet
concn.	concentration	m-equiv	polyethylene	var.	volt
cv.	cultivar	m	milli- [as in mg, ml, mm]	vol.	variety
cwt	hundredweight	M-	milli-equivalent	v/v	volume
d-	deci-	max.	molar concentration	w	volume/volume
DE	dextrose equivalent	min	mega- [as in Mrad]	W.	watt
detrn.	determination	min.	maximum	WHO	West, Western, etc.
DFD	dark firm dry	mol	minute [time]	w/v	World Health
diam.	diameter	mol.wt	minimum	wk	Organization
dil.	dilute	m.p.	mole	yd	weight/volume
DM	dry matter, Deutsche Mark	MPN	.molecular weight	yr	week
DNA	deoxyribonucleic acid(s)	MS	melting point	wt.	weight
dyn	dyne	n-	most probable number	yd	yard
E.	East, Eastern, etc	N	mass-spectrometry	yr	year
ECD.	electron capture detection	N.	nano-[10 ⁻⁹ , as in nm]	μ	micro-[as in g, m]
EDTA	ethylenediaminetetra acetic acid	NMR	Newton [kg m/s ²]	%:	per centum
Eh	oxidation-reduction potential	NPU	North, Northern, normal	>	greater than
ELISA	enzyme-linked immunosorbent assay	oz	concentration	>	greater than or equal to;
f-	femto-[10 ⁻¹⁵ , as in fCi]	P-	nuclear magnetic resonance	<	not less than
°F	degree Fahrenheit	P	net protein utilization	<	less than
FAO	Food and Agricultural Organization	P	ounce	≤	less than or equal to;
FDA	Food and Drug Administration	Pa	pico- [10 ⁻¹² , as in pCi]	not greater than	not greater than
FID	flame ionization detection	PAGE	poise		Chemical symbols are used for all elements
fl oz	fluid ounce	PER	probability		
f.p.	freezing point	p.p.b.	Pascal [N/m ²]		
ft	foot, feet	p.p.m.	polyacrylamide gel electrophoresis		
		PSE	protein efficiency ratio		
		PTFE	parts per billion		
		PVC	parts per million		
		PVDC	pale soft exudative		
			polytetrafluoroethylene		
			polyvinyl chloride		
			polyvinylidene chloride		

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

Nil

FOOD PROCESSING

2367

Banga (JR), Perez-Martin (RI), Gallardo (JM) and Casares (JJ). **Optimization of the thermal processing of conduction-heated canned foods: Study of several objective functions.** *Journal of Food Engineering* 14(1): 1991; 25-51

A new algorithm ICRS/DS, for the solution of fixed terminal time optimal control problems is presented. It is based on the combination of a robust parameterization of the control function and a computationally efficient nonlinear programming algorithm of unconditional convergence. This algorithm is applied to the optimization of the thermal processing of conduction-heated canned foods, attaining for the first time optimum temp.-time profiles for different objective functions: the max. overall retention of a nutrient, the max. retention of a quality factor at the surface of the solid, and the min. process time. A significant increase of quality factor retention at the surface is achieved with a variable retort temp. profile as against the optimum constant-temp. profile. In the case of process time minimization with a constraint of retention of a quality factor at the surface, the processes with a variable retort temp. show significant advantages over the traditional constant-temp. processes. AS

2368

Reid (DS). **Optimizing the quality of frozen foods.** *Food Technology* 44(7): 1990; 78, 80-82

This article considers the main stages in the production of frozen foods during which significant loss in product quality occur such as the initial processing and preparation prior to freezing, the freezing step itself and the frozen storage which follows freezing. It also discusses about optimizing quality loss by identifying appropriate strategies such as the choice of raw material, preprocessing storage, preparation of raw materials for freezing, control of freezing process itself and frozen storage which provides the greatest potential for quality optimization. CSA

2369

Popper (L) and Knorr (D). **Applications of high-pressure homogenization for food**

preservation. *Food Technology* 44(7): 1990; 84, 86-89

This article describes the effects of high-pressure homogenization on the product temp. and on the structural integrity of the microorganisms and also discusses the combination of high-pressure homogenization with lytic enzymes or chitosan, a natural polycationic polymer which reduces the microbial population and heat treatment damage in foods. CSA

FOOD PACKAGING

2370

Feigenbaum (AE), Ducruet (VJ), Delpal (S), Wolff (N), Gabel (J-P), Wittmann (JC). **Food and packaging interactions: Penetration of fatty food simulants into rigid poly(vinyl chloride).** *Journal of Agricultural and Food Chemistry* 39(11): 1991; 1927-1932

Two complementary methods for the detn. of the extent of polymeric packaging penetration by food simulants which are in contact with rigid poly(vinyl chloride) (PVC) are presented: (i) the depth of penetration of the simulant is measured by optical microscopy of sections slices of the material; (ii) methyl red, dissolved in methyl palmitate, was incorporated in the PVC. Subsequent spectrophotometric analysis of the samples from method (ii) reveals that the penetration of the dye is governed by the penetration of the simulant. Absorbance measurements can thus be used for an indirect evaluation of the penetration of the simulant. Mixtures of olive oil and methyl palmitate have been studied, and general considerations on the use of binary mixtures used as food simulants are discussed. AS

FOOD ENGINEERING AND EQUIPMENT

2371

Bhandari (BR), Dumoulin (ED), Richard (HMJ), Noleau (I) and Lebert (AM). **Flavour encapsulation by spray drying: Application to citral and linalyl acetate.** *Journal of Food Science* 57(1): 1992; 217-221

Leaflash spray drying technique was used to encapsulate a mixture of two volatile products, citral and linalyl acetate in the proportion of 80:20 (w/w). The support materials were gum arabic and maltodextrin in different proportions. Very short air product contact time during the drying process allowed encapsulation of these compounds using

high inlet air temp. (300 - 400 C) without any adverse effect on chemical properties. Emulsions were atomized up to 60% total solids concn. In this range of concn., substitution of gum arabic by a less costly maltodextrin was possible achieving 84% volatiles retention. The technique could be efficiently used to encapsulate sensitive flavours. AS

2372

Sheen (S) and Hayakawa (K-I). **Parametric analysis for thawing frozen spheroidal (prolate and oblate) or finitely cylindrical food.** *Journal of Food Science* 57(1): 1992: 236-240, 248

A screening analysis was performed to determine the influence of independent parameters (18) on thawing times of frozen spherical (prolate and oblate) and finitely cylindrical foods using a computerized simulation procedure assuming food volume shrinkage from density changes and temp. dependent physical properties. Of 18 independent parameters, 6 were significant for both foods: thawing medium temp., initial freezing point, Biot number, radiative heat exchange, a parameter for effective specific heat and shape factor (nonsignificant influence of volumetric changes). Predictive regression equations were developed for estimating thawing time as function of significant parameters. Predictive equations were validated experimentally. A sensitivity analysis showed errors in thawing time were influenced most strongly by food dimensions, followed by operational temp., thermophysical properties and convective surface heat-transfer coeff. AS

2373

Das (HK), Dobrinov (LM), Akterian (S) and Simov (Z). **Study of the feeding ability of vertical screw during extrusion.** *Journal of Food Science and Technology (India)* 29(5): 1992: 304-306

Surface Response Milling of parameters involved in single-screw extrusion of casein showed that the optimum mass feed rate was achieved at extruder screw speed of 172-192 r.p.m. and at feeding screw speed of 75-95 r.p.m. For the extrusion of a mixture of casein and corn grits (70:30), max. mass feed rate was found at particle size of 0.4 mm. The mass feed rate was decreased by above 1.2 times when extruder screw compression ratio was increased from 1:1 to 3:1. AS

2374

Lind (I). **Mathematical modelling of the thawing process.** *Journal of Food Engineering* 14(1): 1991: 1-23

A short review of models for the calculation of thawing time and simulation of the thawing process is given. The variables which are important for the process are discussed with the emphasis on the heat and mass transfer at the surface of the product. A model for the simulation of thawing time, transient temp. distribution and mass transfer at the surface in convective thawing processes in humid air is presented. The model is found to give comparatively good agreement with experimental results for thawing times, temp. distribution and wt. changes during thawing. AS

2375

Rahman (MS). **Evaluation of the precision of the modified Fitch method for thermal conductivity measurement of foods.** *Journal of Food Engineering* 14(1): 1991: 71-82

A device was developed for measurement of thermal conductivity of solid food materials above and below freezing. The system is a modification of the Fitch apparatus. A disc-shaped sample with a constant thickness is placed in the compartment between a Cu rod and a Cu disc. The disc and rod act as a heat source and sink. The instrument was tested and calibrated by measuring the thermal conductivity of ice, frozen chicken meat (white), fresh potato and apple. AS

2376

Rovinsky (LA). **Hydrocyclones for processing food liquids.** *Journal of Food Engineering* 14(2): 1991: 129-138

A model of the dynamics of the rotating flow of a fluid with suspended particles is presented. The research describes the conditions for particle separation and the dimensions of the separated particles. It further suggests a new design of hydrocyclone, calculation methods for the separation process and design parameters for the apparatus. Calculations are also presented for numerical parameters of hydrocyclones of both types and the latter were compared to evaluate the prospects of hydrocyclone usage for the separation of large fat particles in milk. AS

2377

Narsimhan (G). **A model for unsteady state drainage of a static foam.** *Journal of Food Engineering* 14(2): 1991: 139-165

A model for the unsteady state drainage of a standing foam has been proposed. This model accounted for (i) the liquid drainage from plateau borders due to gravity as well as the gradient of plateau border suction and (ii) the movement of the foam-liquid interface due to the accumulation of

drained liquid, and assumed that the foam bed consisted of dodecahedral bubbles of the same size. The simplifying assumption of a negligible fraction of liquid in thin films, employed in the present model, was justified through the comparison of the time scales of film and plateau border drainage. Typical evolutions of a liquid holdup profile as well as a foam-liquid interface are reported for foam generated by bubbling inert gas through a liquid pool at a constant gas flow rate in the form of bubbles of the same size. The predicted equilibrium liquid holdup profile has been shown to depend only on the density difference, bubble size and surface tension but not on viscosity, surface viscosity and compared well with experimental data. Asymptotic expression for the equilibrium disjoining pressure indicated that larger density difference, larger bubble sizes and smaller surface tensions would tend to make the standing foam less stable. AS

2378

Maroulis (ZB), Kiranoudis (CT) and Marinos-Kouris (D). **Simultaneous estimation of heat and mass transfer coefficients in externally controlled drying.** *Journal of Food Engineering* 14(3): 1991; 241-255

An externally controlled drying model, involving the heat and mass transfer coeff. as model parameters, is proposed. A non-linear regression procedure was applied to fit the model to experimental data on material moisture content and temp. The precision and correlation of the estimated coeff. are examined by considering the joint confidence regions. The method is applied successfully to an industrial belt dryer for moisture removal from raisins. AS

2379

Lepine (FL). **Effects of ionizing radiation on pesticides in a food irradiation perspective: A bibliographic review.** *Journal of Agricultural and Food Chemistry* 39(12): 1991; 2112-2118

The effects of γ -irradiation on pesticides in sol. or in food are reviewed. Degradation of pesticides is generally greater in irradiated aqueous sol. than in aliphatic solvents or in food. Degradation products of some pesticides have been identified in organic solvents, but very few studies of this type have been performed on irradiated food. Addition products between molecules of solvent and pesticides have been observed. These results are discussed in a food irradiation perspective. AS

Equipments

2380

Runyon (CH), Rumsey (TR) and McCarthy (KL). **Dynamic simulation of a nonlinear model of a**

double effect evaporator. *Journal of Food Engineering* 14(3): 1991: 185-201

The nonlinear dynamic behaviour of a double effect evaporator system is modeled. The governing equations were solved using Advanced Continuous Simulation Language (ACSL). Simulations were performed for a commercial double effect tomato paste evaporator using two possible control configurations. Experimental measurements were obtained for a commercial double effect evaporator. Simulation values for feed flow rate and product solids concn. are compared with experimental measurements in response to varying feed solids concn. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2381

Mistry (B) and Min (DB). **Reduction of dissolved oxygen in model salad dressing by glucose oxidase-catalase dependent on pH and temperature.** *Journal of Food Science* 57(1): 1992: 196-199

Glucose oxidase-catalase showed max. activity at pH 6 and 30 C in the salad dressings. The 0.5% glucose was sufficient to remove 92% of the dissolved oxygen in the salad dressing during 5 days storage. SRA

2382

Phifer (DWJr) and Costello (CA). **Characterization of polypropylene and polyester meltblown materials used for food oil absorption.** *Journal of Food Science* 57(1): 1992; 213-216

Meltblown polypropylene and polyester and paper towels were examined for food oil absorption capacity by wt. difference method. Six food oils (coconut, corn, cottonseed, olive, safflower, and sunflower) were used to include a range of fatty acid compositions. Materials were examined by scanning electron microscopy to note physical characteristics that related to absorption. Polypropylene absorbed 33.4% of the oils compared to 25.1% for polyester and 24.2% for paper towels. This was noted by the large pore size and small diam. fibers forming great numbers of pockets which could

include oil. Polypropylene material should be considered in microwavable packaging as means to decrease dietary fat. AS

2383

Sotelo (A) and Alvarez (RG). **Chemical composition of wild *Theobroma* species and their comparison to the cocoa bean.** *Journal of Agricultural and Food Chemistry* 39(11); 1991; 1940-1943

Theobromine, caffeine, and theophylline content were determined in different parts of the plant in two var. of *Theobroma cacao* and 2 wild *Theobroma* sp., *Th. bicolor* and *Th. angustifolium*. Proximate analysis was performed for the bean, pulp, and shell of the 4 samples, and trypsin inhibitors and hemagglutinins were also investigated in beans and leaves. Fat was the main component in the seeds of all of the samples. The highest levels of alkaloids were found in the seeds of both var. of *Th. cacao*, theobromine being the main alkaloid found: 1.39 and 2.03 g/100 g in seeds of criollo and Costa Rica var., respectively. In the *Th. bicolor* the highest concn. of theobromine was in the hull, 915 mg, followed by flowers, 725 mg, and leaves 619 mg/100 g of sample. In *Th. angustifolium*, the highest concn. of theobromine was in the flowers (510 mg/100 g of sample). Caffeine was the second more important alkaloid in the cacao beans (180 - 920 mg/100 g of sample). In the wild theobroma sp. it was the alkaloid found in the lowest concn. in the seeds; in the flowers of the *Th. bicolor* it was in higher concn. (96 mg/100 g of sample). Theophylline in the *Theobroma* genus has not been previously reported. The highest concn. was found in the seeds of *Th. cacao* (357 - 367 mg/100 g of sample) and in the flowers and leaves of *Th. bicolor* (301 and 187 mg/100 g of sample, respectively). Trypsin inhibitor content in the seeds of *Th. cacao* was higher than in the wild sp. 30 - 41 and 8 - 8.6 TUI/mg of sample, respectively. No hemagglutinins were found in any of the four samples studied. AS

2384

Oduoza (CF). **Studies of food value and contaminants in canned foods.** *Food Chemistry* 44(1); 1992; 9-12

Analysis of some shop shelf and immediate factory products of canned tomato purees and orange juices showed that the tomato purees contained higher concn. of heavy metals than the orange juices except Fe. Shop shelf samples of all products contained larger concn. of Fe, Sn and Pb than the factory sausages. However these contaminant levels were within the prescribed limits. The proximate compositions for both the products being lower than the equivalent natural products, compared well with literature values. SD

Chemistry (Analytical)

2385

Karovicova (J) and Polonsky (J). **Determination of synthetic colourants by capillary isotachophoresis.** *Die Nahrung* 35(4); 1991: 403-404

2386

Chen (BH) and Yang (SH). **An improved analytical method for the determination of carotenes and xanthophylls in dried plant materials and mixed feeds.** *Food Chemistry* 44(1); 1992; 61-66

By current AOAC methods, nitrogen gas and antioxidants (BHT) incorporated during extraction and saponification increased carotene and xanthophyll contents from 2 - 4% and 19 - 30% respectively. Similarly extraction and saponification time for 16 h increased xanthophyll to 23% approximately and cold saponification resulted in higher xanthophylls than hot saponification. In the improved method a 1:1 mixture of MgO and diatomaceous earth replaces silica gel as the adsorbent to separate major carotenoids by open column chromatography. A binary solvent system of hexane-acetone and a ternary solvent system of hexane-acetone methanol in different ratios separate carotenes and other pigments. This method gives substantially high β -carotene and lutein values. SD

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

2387

Meerdink (G) and van't Riet (K). **Inactivation of a thermostable α -amylase during drying.** *Journal of Food Engineering* 14(2); 1991; 83-102

Thermal inactivation kinetics of a thermostable α -amylase were determined experimentally at different water concn. Maltodextrin was used as support material. The inactivation kinetics could be described by a simple first order Arrhenius-type model. Drying exp. with single droplets were carried out in which water concn., temp. and residual α -amylase activity were determined as a function of the drying time. A mathematical model based on the binary diffusion equation and the inactivation kinetics can be developed that describes the inactivation of α -amylase during drying. AS

Microorganisms

2388

Peterz (MEG). **Temperature in agar plates and its influence on the results of quantitative microbiological food analyses.** *International Journal of Food Microbiology* 14(1): 1991: 59-66

The numbers of CFU of some strains of Enterobacteriaceae growing in Violet Red bile agar at 44°C can vary considerably depending on incubation conditions and location of an individual agar plate in a stack. The reason is that the heating-up rates of the agar in plates incubated at elevated temp. are slower if the incubators do not have an air circulator and/or if the plates are located in the centre of a stack. Variability in agar temp. among different plates after 24 h of incubation at 44°C was higher if plates were placed in an incubator with an air circulator than in an incubator without one. This effect could be avoided if the plates were incubated enclosed in a plastic bag. AS

Bacteria

Aeromonas hydrophila

2389

Palumbo (SA) and Williams (AC). **Growth of Aeromonas hydrophila K144 as affected by organic acids.** *Journal of Food Science* 57(1): 1992: 233-235

The effect of different organic and inorganic acids on the aerobic growth kinetics of *Aeromonas hydrophila* K 144 as a representative strain in culture broth containing 0.5 and 2% NaCl and incubated at 5 and 19°C were studied. Type of acid, pH, NaCl level and temp. influenced lag and generation times of the organic acids (OA) acetic acid and lactic acid prevented growth of *A. hydrophila* K 144 respectively at 5°C and pH 6.0 and pH 5.5. The high NaCl level interacted with type of acid and pH to inhibit microorganism growth at the lower temp. of incubation. The OAs inhibit growth at higher pH values than inorganic acids (HCl and H₂SO₄). Acetic and lactic acids were effective in controlling the growth of *A. hydrophila* and could readily be combined with low holding temp. to render foods free of the organisms. SRA

Listeria monocytogenes

2390

McClure (PJ), Kelly (TM) and Roberts (TA). **The effects of temperature, pH, sodium chloride and sodium nitrite on the growth of Listeria**

monocytogenes. *International Journal of Food Microbiology* 14(1): 1991: 77-92

An automated turbidimetric system using multiwelled plates was used to examine the effects of different combinations of NaCl (0.5 - 8.0% w/v), NaNO₂ (0 - 400 µg/ml) pH (4.6 - 7.4) and temp. (5 - 30°C) on the growth of *Listeria monocytogenes* in tryptone soya broth. The data presented clearly illustrate the combinations that permit visible growth of the organism. The ability of *L. monocytogenes* to grow at low pH levels was strongly influenced by incubation temp. as well as NaNO₂ concn. At 20°C and below, no visible growth was detected, even with 50 µg/ml NaNO₂ at pH except at higher concn. and also at lower incubation temp. AS

Pseudomonas gladioli

2391

Cadwallader (KR), Braddock (RJ) and Parish (ME). **Isolation of α-terpineol dehydratase from Pseudomonas gladioli.** *Journal of Food Science* 57(1): 1992: 241-244, 248

An enzyme which converts the citrus by-product limonene to α-terpineol was purified 13-fold. After cell disruption of *P. gladioli*, α-terpineol dehydratase (α-TD) remained associated with a heterogeneous group of particulate material. α-TD was partially solubilized by extraction with 10 mM HEPES buffer, pH 7.0 containing 2.0% (w/v) Triton X-100 and 0.5M sodium trichloroacetate. Two soluble forms existed in 1.0% (w/v) Triton X-100 with apparent mol. wt. of 94,500 and 206,500 daltons. AS

Salmonella

2392

Skjerve (E) and Olsvik (O). **Immunomagnetic separation of Salmonella from foods.** *International Journal of Food Microbiology* 14(1): 1991: 11-18

Salmonella could be separated from different inoculated foods using antibody-coated immunomagnetic beads. When applied on suitable foods, the immunomagnetic separation technique showed a sensitivity of 10 - 20 *Salmonella* cells/g of the original sample. The technology appeared less useful for some food items. AS

2393

Blais (BW) and Yamazaki (H). **Application of polymyxin-coated polyester cloth to the semi-quantitation of Salmonella in processed foods.** *International Journal of Food Microbiology* 14(1): 1991: 43-50

A rapid and economical semi-quantitative test for *Salmonella* cells in foods is proposed. Food samples containing different levels of *Salmonella* cells were homogenized and serially diluted in enrichment broths and then incubated for about 20 h at 37 C. The presence of *Salmonella* cells in each dilution was assayed by capturing deoxycholate-extracted *Salmonella* lipopolysaccharides on a sheet of polymyxin-coated polyester cloth, followed by colorimetric detection with an anti-*Salmonella* antibody-enzyme conjugate. The min. dilutions which resulted in no detectable growth were correlated with the extent of *Salmonella* contamination in the food samples. AS

2394

Perales (I) and Erkiaga (E). **Comparison between semisolid Rappaport and modified semisolid Rappaport-Vassiliadis media for the isolation of *Salmonella* spp. from foods and feeds.** *International Journal of Food Microbiology* 14(1): 1991: 51-58

Two semisolid media poured in petri dishes, semisolid Rappaport and modified semisolid Rappaport-Vassiliadis were compared for the recovery of *Salmonella* spp. from 154 high- and low-moisture foods and feeds. Semisolid media were inoculated after pre-enrichment in buffered peptone water and after enrichment in Muller-Kauffmann tetrathionate broth and selenite cystine broth. Also a conventional procedure was used, where the enrichment broths were streaked on Brilliant Green and bismuth sulphite agars. Of 62 samples found positive for *Salmonella* by one or more methods, semisolid Rappaport detected all of them and 60 when inoculated directly from the pre-enrichment broth. Modified semisolid Rappaport-Vassiliadis gave only 20 positive samples. The difference in productivity between semisolid-Rappaport and the other media poured in plates (modified semisolid Rappaport Vassiliadis, Brilliant Green and bismuth sulphite agar) was statistically significant ($P < 0.0001$). The incubation temp. recommended for modified semisolid Rappaport-Vassiliadis (42 C) was found to be too high. By comparison to the other media, semisolid Rappaport gave a 500% increase in the detection of the *enteritidis* serotype of *Salmonella*. AS

Staphylococcus

2395

Pereira (JL), Salzberg (SP) and Bergdoll (MS). **Production of staphylococcal enterotoxin D in foods by low-enterotoxin-producing staphylococci.** *International Journal of Food Microbiology* 14(1): 1991: 19-26

The goal of this investigation was to determine whether staphylococcal strains producing enterotoxins at nanogram levels per milliliter in lab. medium, not detectable by gel diffusion methods, could produce sufficient enterotoxin in foods to result in food poisoning. Three low-enterotoxin D (SED)-producing strains were selected for this research because this enterotoxin is produced in smaller amounts than the other enterotoxins. The foods used were cream pie and cooked ham, divided into two portions, sterile and non-sterile. Each portion was inoculated with known concn. of the staphylococcal strains under study and incubated for 48 h at 25, 30, and 37 C. Samples were taken after 24 and 48 h. Enterotoxin was detectable in both sterilized and unsterilized cream and ham after 24 h at 37 C with an inoculum of 10^3 /g. Some strains produced detectable amounts of enterotoxin in the sterilized foods after 24 h at 30 C and some produced detectable amounts of enterotoxin in the sterilized foods after 24 h at 25 C with inocula of 10^4 /g. It can be concluded that staphylococcal strains producing enterotoxin at ng/ml levels in lab. medium, not detectable by gel diffusion methods, can produce sufficient enterotoxin (ng/g) in foods to cause food poisoning. AS

2396

Wieneke (AA). **Comparison of four kits for the detection of staphylococcal enterotoxin in foods from outbreaks of food poisoning.** *International Journal of Food Microbiology* 14(3/4): 1991: 305-312

Four commercial kits, three based on sandwich ELISA techniques and one on latex agglutination were compared for the detection of staphylococcal enterotoxins in foods from outbreaks of food poisoning. Enterotoxin was detected in 14 of 18 foods with the Swiss SET-EIA and in 9 or 10 with the Unipath SET-RPLA and two ELISAs from Transia. The advantages and disadvantages of the 4 methods are discussed. AS

2397

Notermans (S), Dufrenne (J) and Veld (P). **Feasibility of a reference material for staphylococcal enterotoxin A.** *International Journal of Food Microbiology* 14(3/4): 1991: 325-331

A reference material for staphylococcal enterotoxin A(SEA), was produced by spray-drying the toxin in milk. With the procedure the SEA was distributed homogeneously in the material. For ease of handling the reference material was encased in gelatin capsules, each containing 405 ng of SEA. Simply dissolving the milk powder in distilled water resulted in a 100% recovery of the SEA present. The reference material would appear suitable for testing

laboratory performance, comparison of detection methods and to validation of extraction procedures. AS

Hygiene

2398

Farrell (GM) and Marth (EH). **Borrelia burgdorferi: another cause of foodborne illness?**. *International Journal of Food Microbiology* 14(3/4): 1991: 247-260

Borrelia burgdorferi was identified as the etiological agent of Lyme disease in 1982. This Gram-negative spirochete is classified in the order Spirochaetales and the family Spirochaetaceae. The pathogen is fastidious, microaerophilic, mesophilic and metabolises glucose through the Embden-Meyerhof pathway. A generation time of 11 to 12 h at 37°C in Barbour-Stoermer-Kelly medium has been reported. Lyme disease, named after Lyme in Connecticut, is distributed globally. It is the most commonly reported vector-borne disease in the United States, where the incidence is highest in the eastern and midwestern states. Since establishment of national surveillance in 1982, there has been a nine-fold increase in the number of cases reported to the U.S. Centers for Disease Control. The deer tick of the genus *Ixodes* is the primary vector of Lyme borreliosis. The tick may become infected with *B. burgdorferi*, by feeding on an infected host, at any point in its 2-year life cycle which involves larval, nymphal and adult stages. The infection rate in deer ticks may be as high as 40% in endemic areas. The primary vertebrate reservoirs for *Ixodes* are the white-footed mouse (*Peromyscus leucopus*) and the white-tailed deer (*Odocoileus virginianus*). Dairy cattle and other food animals can be infected with *B. burgdorferi* and hence some raw foods of animal origin might be contaminated with the pathogen. Recent findings indicate that the pathogen may be transmitted orally to lab. animals, without an arthropod vector. Thus, the possibility exists that Lyme disease can be a food infection. In humans, the symptoms of Lyme disease, which manifest themselves days to years after the onset of infection, may involve the skin, cardiac, nervous and/or muscular systems, and so misdiagnosis can occur. AS

2399

Bryan (FL). **Application of HACCP to ready-to-eat chilled foods.** *Food Technology* 44(7): 1990: 70, 72, 74-77

The approaches undertaken by the Hazard Analysis Critical Control Point (HACCP) system which offers the highest degree of food safety for chilled foods prepared in foodservice and food-market establishments involving the detn. of hazards and

assessing their severity and risks, identifying critical control points, developing criteria for control and applying preventive/control measures, monitoring critical control points and taking immediate action to correct the situation whenever the criteria are not met are the aspects discussed in this article. CSA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

2400

Graham (DM), Filer (LJ Jr) and Bigelow (SW). **Assessing dietary exposure to food additives: A new approach.** *Food Technology* 44(7): 1990: 94, 96

This article attempts to explain how the new method called Dietary Exposure Assessment Method (DEAM) provides per capita consumption estimates of dietary exposure to food additives. CSA

Antioxidants

2401

Chen (C), Pearson (AM) and Gray (JL). **Effects of synthetic antioxidants (BHA, BHT and PG) on the mutagenicity of IQ-like compounds.** *Food Chemistry* 43(3): 1992: 177-183

Ames Test showed that BHA and n-propyl gallate (PG) inhibited the mutagenicity of 2-amino-3-methylimidazo-[4,5-f] quinoline; 2-amino-3,4-dimethylimidazo-[4,5-f] quinoline and 2-amino-3,8-dimethylimidazo-[4,5-f] quinoxaline but whereas BHT had little effect on the first two at low concn.: increased mutagenicity at higher concn. and slightly inhibited the mutagenicity of the latter one at all concn. SD

Colourants

2402

El-Saadany (SS). **Biochemical effect of chocolate colouring and flavouring like substances on thyroid function and protein biosynthesis.** *Die Nahrung* 35(4): 1991: 335-343

Synthetic chocolate colourant, flavourant and the mixture of both, administered to healthy adult male albino rats showed significant increase in serum protein, RNA and thyroid hormone (T₄), while DNA and thyroid hormone (T₃) were insignificantly elevated. The activity of glucose-6-phosphate dehydrogenase (G-6-PO) and 6-phosphogluconate dehydrogenase (6-PGD) in both cytoplasmic and mitochondrial fractions of organs (brain, liver and kidneys) were increased. The rats fed on diets supplemented with the mixture of both colourant and flavourant followed by colourant than flavourant, respectively showed highest increase in G-6-PD and 6-PGD. BV

CEREALS

2403

Uberoi (SK), Vadhera (S) and Soni (GL). **Role of dietary fibre from pulses and cereals as hypocholesterolemic and hypolipidemic agent.** *Journal of Food Science and Technology (India)* 29(5): 1992; 281-283

Inclusion of dietary fibre from seed coat of wheat, maize, *Cicer arietinum* seed (CAS) (green) and soybean in hypercholesterolemic diet, showed no interference with the food intake or its utilization for growth. Fibres lowered the levels of plasma as well as tissue total lipids cholesterol and glycerides, the effect being prominent with soybean and *C. arietinum* seed. In addition, soybean and *C. arietinum* seed fibres appeared to be potent anti-atherogenic agents. The hypocholesterolemic action of fibre could be directly correlated with their bile acid binding capacity and inverse relationship to water holding capacity. In general, higher was the lignin content of fibre, better was the hypocholesterolemic effect. AS

2404

Sauvageot (F) and Blond (G). **Effect of water activity on crispness of breakfast cereals.** *Journal of Texture Studies* 22(4): 1991; 423-442

Extrusion cooked breakfast cereals (commercial-2, experimental-1) placed over 10 saturated salt sol. in desiccator for 3 wks were analysed by sensory, mechanical and differential scanning calorimetric methods. Crispness slightly reduced between 0 and 0.5 aw or 7% (water content) and afterwards rapidly reduced. The value of critical aw did not depend on the product. The sensory crispness and deformation showed good correlation to the first fracture. SD

2405

Acquistucci (R) and Pasqui (LA). **A study concerning a method for the rapid determination of semolina colour.** *Die Nahrung* 35(4): 1991; 345-349

Semolina colour is a technological parameter very useful for pasta makers. Studies to test the possibility of measuring semolina colour by employing the b and the L value (yellowness and lightness) for the routine analysis were carried out. Factors which could systematically affect this measurement were also investigated. For this purpose, the relationship between the chemical method of pigments extraction (AACC) and reflectance measurements was examined. The investigation showed that the b value is the most suitable parameter for the evaluation of semolina colour which can be employed for the classification of products. Several variables affect the reflectance measurement but the results of this work suggest that ash and protein amount did not have a recognizable effect on the measurement of b. On the contrary, the L measurement was influenced by the extraction rate of semolina because of the ash amount in flours. AS

2406

Adeyeye (A) and Ajewole (K). **Chemical composition and fatty acid profiles of cereals in Nigeria.** *Food Chemistry* 44(1): 1992; 41-44

The water, oil, ash, protein and carbohydrate were in the ranges 9.4 - 11%, 0.3 - 4.9%, 0.8 - 2.6%, 6.5 - 10.9% and 70.7 - 82.4% respectively for sorghum, millet, maize and rice. The rich mineral concn. varied from 325-450 mg/100 g for K; 180 - 390 mg/100 g for P and 80 - 195 mg/100 g for Mg while Ca, Na, Mn, Fe, Cu and Zn had lower concn. All the grains had high degree of unsaturation (75.8 - 86.4%), high essential fatty acids and fatty acids (stearic, oleic and linoleic); sorghum had the highest protein and essential fatty acids. SD

Barley

2407

Kamini Sood, Dhaliwal (YS), Kalia (M) and Sharma (HR). **Utilization of hulless barley in Chapati making.** *Journal of Food Science and Technology (India)* 29(5): 1992; 316-317

Addition of hulless barley flour (HBF) to wheat flour increased protein content, but it had diluting effect on the gluten content. The water absorption capacity of blended samples was higher. Puffing of chapatis in all composite flours was satisfactory. Colour, appearance and texture of chapatis were good upto 30% of HBFs in the blends, but flavour

score was slightly decreased. Chewability of chapati was acceptable upto 40% of HBF in the blend. AS

Paddy

2408

Singaravadivel (K) and Anthoni Raj (S). **Chalkiness in parboiled paddy due to microbial contamination.** *Journal of Food Science and Technology (India)* 29(5): 1992: 312-314

Microbial infection in parboiled paddy caused chalky kernels. Moulds like *Mucor*, *Aspergillus flavus*, *A. fumigatus*, and *A. niger* often occur in parboiled paddy during incomplete yard drying especially in monsoon periods of October-November in coastal Tamil Nadu. Such infection converts the translucent kernels into chalky ones. Re-parboiling reduced the microbial population and improved the head rice recovery. AS

Rice

2409

Palani Muthu (V) and Chattopadhyay (PK). **Thin layer drying characteristics of parboiled milled rice.** *Journal of Food Science and Technology (India)* 29(5): 1992: 275-277

Thin layer drying characteristics of a medium grain parboiled milled rice between temp. range of 40 to 100 C RH range of 4 to 49% were studied. An empirical thin layer drying expression was developed for parboiled milled rice and the constants of the equation were related to the temp. and RH of the drying air. AS

2410

Funaki (J), Abe (K), Hayabuchi (H) and Arai (S). **Modulating the conditioning of meat by the use of oryzacystatin, a cysteine proteinase inhibitor of rice seed origin.** *Journal of Food Biochemistry* 15(4): 1991: 253-262

Frozen meat cubes (2x2x2 cm each) aged 3 days were treated with a 0.1 fold wt. of papain sol. and incubated at 8 C. 2% papain sol. was used for 2 h at 8 C to get the most favourable tenderization. The incubation of a meat cube with papain for the first 2 h and then with an adequate amount of added oryzacystatin for the subsequent 22 h was effective in regulating overtenderization. GS

2411

Raju (GN) and Srinivas (T). **Effect of husk morphology in grain development and**

topography in rice. *Economic Botany* 45(3): 1991: 429-434

Kernels grown within loosened glumes in 3 var. of paddy were darker in colour and had a smoother surface than those grown under normal conditions. The thickness of the pericarp plus seed coat layers was 33.6 plus or minus 2.8 μm , and the thickness of the aleurone layers was 21.7 plus or minus 2.5 μm in grains of the first type, while in the normal grains, these dimensions were 13.0 plus or minus 1.4 and 26.9 plus or minus 2.9 μm respectively. The kernels which developed within loosened glumes tended to taper towards the distal end. They were lighter in wt. than normal grains by 32 to 67%, the wt. loss being less in the bolder var. The lemma-palea interlocking depth was positively correlated with the groove depth on the kernel and with the clearance between husk and kernel. All 3 parameters showed a positive correlation with grain breadth. A low lemma-palea interlocking depth and a smaller clearance between husk and kernel are technologically desirable characteristics in rice. The reclasping of the 2 glume components after pollination was essential for the normal development of the rice grain. AS

Brown rice

2412

Sabularse (VC), Luizzo (JA), Rao (RM) and Grodner (RM). **Physicochemical characteristics of brown rice as influenced by γ -irradiation.** *Journal of Food Science* 57(1): 1992: 143-145

Brown rice samples prepared from medium grain (Mars) and long grain (Lemont and Tebonnet) var. were irradiated at 0, 1.0, 2.0 and 3.0 kGy and analysed. The amount of solids leached upon cooking increased with increased irradiation dose levels indicating the degradation of the rice grain structure. Damaged starch for 'Mars' decreased to 1.0 kGy level and increased at 2.0 kGy level. Moisture content of rice samples, between 13% and 14% was not significantly affected by irradiation. As the level of γ -irradiation increased, peak viscosity, hot paste viscosity (at the end of 15 min holding at 95 C) and viscosity at 50 C decreased. Increased yellow colour was noticed in rice samples as the radiation increased. SRA

Triticales

2413

Blanchflower (AJ) and Briggs (DE). **Micromalting triticale: Optimising processing conditions.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 103-115

Small-scale trials were carried out to optimise the conditions for micromalting triticale grain, using 3 var. grown in the UK. Compared with barley, triticale grains required short steeping periods with a short air rest. They malted rapidly, and produced malts with high hot water extracts after 4 or 5 days' germination. Applications of gibberellic acid and potassium bromate during malting significantly altered the qualities of malts. Gibberellic acid increased hot water extracts, soluble nitrogen levels and malting losses. When the additives were used in combination, high hot water extracts were obtained and malting losses were reduced relative to controls, but unexpectedly the level of total soluble nitrogen was elevated and did not significantly differ from that obtained using gibberellic acid alone. Both additives usefully reduced wort viscosities, which were unacceptably high by barely malt brewing standards. Wort separation from small-scale mashes was slow. AS

2414

Blanchflower (AJ) and Briggs (DE). **Micromalting triticale: Comparative malting characteristics.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 117-128

Small-scale trials were carried out to compare the malting characteristics of 12 triticale var. harvested in the UK in 1985. Grain samples from 2 locations, each having grain total nitrogen contents of between 1.78 and 2.57% were micromalted. The results established varietal differences in malting quality with respect to grain water uptake, optimum germination period and malt hot water extract. Hot water extracts after a 5-day germination period ranged between 302 and 324 litre⁰ kg⁻¹ with malt yields in the range 87 - 90%. Compared with barley malts, triticale malts possessed extremely high 70°C mash wort viscosities of between 10.4 and 26.9 cSt. The appendix shows the advantages of adjusting x0.2-scale hot water extract mashes to a final wt. of 100 g rather than 90 g. AS

Wheat

2415

Gontard (N), Guilbert (S) and Cuq (J-L). **Edible wheat gluten films: Influence of the main process variables on film properties using response surface methodology.** *Journal of Food Science* 57(1): 1992: 190-195, 199

An edible wheat gluten film was developed and effects of gluten concn., ethanol concn. (ET) and pH of the film-forming sol. on various film properties were evaluated using Response Surface Methodology. pH and ethanol concn. had strong interactive effects on film opacity, water solubility

(WS) and water vapour permeability (WPP). A simultaneous variation of ethanol concn. and pH between 32.5% ET, pH 4 and 45% ET, pH 2 resulted in homogenous and transparent film with relatively low WS. The lowest WPP would be expected with 20% ethanol concn. and pH 6. Mechanical properties were mainly affected by gluten concn. and pH. The most resistant film was obtained at high gluten concn. (12.5%) and pH 5. AS

2416

Gupta (RB), Shepherd (KW) and MacRitchie (F). **Genetic control and biochemical properties of some high molecular weight albumins in bread wheat.** *Journal of Cereal Science* 13(3): 1991: 221-235

Analysis of aneuploid stocks of Chinese Spring wheat showed that some of the seed protein bands separated by two-step SDS-PAGE (Mr 65, 63, 60 and 45k) are controlled by genes on the chromosome arms 4DL, 4AL 5AL and 5DL. The extractability characteristics of these bands indicated that they are albumins. One dimensional SDS-PAGE analysis of protein fractions separated by size exclusion HPLC showed that these albumin bands are part of the polymeric protein fraction in bread wheat. Fractionation of total seed-proteins by diagonal electrophoresis (unreduced x reduced) revealed that high mol. wt. albumin bands occur in both polymeric (disulphide-linked aggregates) and monomeric forms in their native state. These proteins were rapidly degraded during seed germination like the storage proteins of wheat. They were found not to be present in the protein bodies from developing wheat endosperm, however. Subsequent analysis of these albumins using immunoblotting revealed that the bands controlled by chromosome arm 4DL, 4AL and 5AL are β -amylases of wheat grain, and are probably encoded at the β -Amy-1 loci on these arms. A limited amount of allelic variation in these bands was observed by two-step SDS-PAGE of different bread wheat cvs. AS

2417

McCormack (G), Panizzo (J), Bekes (F) and MacRitchie (F). **Contributions to breadmaking of inherent variations in lipid content and composition of wheat cultivars. I. Results of survey.** *Journal of Cereal Science* 13(3): 1991: 255-261

Relationships between test-bake loaf volume and flour lipid parameters were investigated for 14 wheat cvs grown in 3 successive crop years (1984, 1985 and 1986). In 2 of the crop years (1985 and 1986), each cv was grown at 6 levels of N for fertilizer and in 1986 the extra cv was included in the survey. Loaf volumes were measured in an optimized baking test.

Two separate solvent systems were used to extract lipids - light petroleum (b.p. 40 - 60 C) and chloroform. Lipid content was determined by Soxhlet extraction and gravimetric analysis and lipid composition in terms of polar (PoL) and non-polar (NP) components determined by densitometry of TLC patterns. Low but consistent correlations were found between loaf volume and several lipid parameters for each crop year and for each solvent system, in particular, total non-starch lipid (chloroform extract) and NP/PoL ratio. It was estimated that, in the present survey, differences in total lipid could account for up to 5% and the NP/PoL ratio for up to 11% of the variation in loaf volume. AS

Wheat flour

2418

Indrani (D) and Venkateswara Rao (G). **Influence of additives on the rheological and bread making characteristics of differently milled whole wheat flours.** *Journal of Food Science and Technology (India)* 29(5); 1992; 296-298

Effect of potassium bromate and ascorbic acid on the dough and bread making characteristics of whole wheat flour milled in hammer, disc, stone, and roller mills indicated that the improvement in the dough properties varied for the differently milled flours. The breads from hammer and roller milled flours were better in quality than those from disc and stone milled flours. Improvement in the quality of breads due to additives was higher in hammer and roller milled flours than in disc and stone milled flours. AS

Wheat proteins

2419

Inda (AE) and Rha (C). **Dynamic viscoelastic behaviour of wheat gluten: The effects of hydrogen bonding modification by urea and deuterium oxide.** *Journal of Texture Studies* 22(4); 1991; 393-411

Differential scanning calorimetry and photoacoustic ultraviolet spectroscopy study results revealed that the storage and loss moduli of freeze-dried gluten reconstituted with water and deuterium oxide at the same frequency were higher for deuterated gluten. Deuterium oxide does not cause conformational changes in gluten and its main effect is a moderate increase in the strength of hydrogen bonding. For gluten reconstituted with urea, increasing urea concn. reduced frequency dependence of the storage modulus and a large decrease in the magnitude of the loss modulus, especially at low frequencies. The increase in elasticity caused by urea was explained

by the unfolding of the proteins upon disruption of hydrogen bonding. Calorimetric and ultraviolet spectroscopic data confirm that urea and deuterium oxide caused the rheological changes. SD

2420

Du Cros (DL). **Isolation and characterization of two γ -gliadin proteins from durum wheat.** *Journal of Cereal Science* 13(3); 1991; 237-253

Gamma-gliadins 42 and 45, which are correlated with poor and good quality, respectively, in durum wheat, were isolated and characterized. Comparison of the two proteins revealed identity in the sequence of amino acids in their N-terminal regions, but slight differences in their mol. wts. and amino acid compositions. The most significant differences between gliadins 42 and 45 related to variations in the positions of cysteine residues in their amino acid sequences. These differences, coupled with inferred differences in hydrophobicity, may indicate that these proteins may make a contribution to dough properties additional to that of the low mol. wt. glutenin subunits whose coding genes are tightly linked to those of these gliadins. AS

MILLETS

2421

Navita (G) and Sumathi (S). **Effect of primary processing on dietary fibre profile of selected millets.** *Journal of Food Science and Technology (India)* 29(5); 1992; 314-316

Effect of primary processing on dietary fibre (DF) profile of sorghum, bajra, ragi and wheat showed highest and lowest total DF in ragi and bajra. The insoluble fibre content of unprocessed and processed flour samples was found to be high in ragi. Conversely soluble DF content was found to be high in bajra, though its total DF content is low. The total DF content of sorghum bran was found to be low and wheat bran was high. A significant ($P < 0.01$) decrease in total DF and its components in all samples was observed on processing. AS

2422

Ravindran (G). **Seed protein of millets: Amino acid composition, proteinase inhibitors and in vitro protein digestibility.** *Food Chemistry* 44(1); 1992; 13-17

The non-protein nitrogen (NPN) accounted for 17.3, 12.5 and 17% of the total N found in common millet (*Panicum milaceum* 6 var.) finger millet (*Eleusine coracana* 3 var.) and foxtail millet (*Setaria italica* 4

var.) respectively. Millet protein, being deficient in lysine, has adequate levels of other essential amino acids which were comparable between var. The proteins in finger millet were better balanced than the other two var. In millets the anti-trypic activities were higher than the anti-chymotryptic activities which could not be detected in foxtail var. The low *in vitro* protein digestibility values of raw and uncooked millets improved on cooking. SD

Corn

2423

Barrett (AM) and Peleg (M). **Cell size distributions of puffed corn extrudates.** *Journal of Food Science* 57(1): 1991: 146-148, 154

The cell size distributions of various experimental puffed corn extrudates were determined by image analysis, applied to longitudinal and transversal cross sections. Individual cell cross-sectional area was used as the size measure. All the cell size distributions, regardless of specimen orientation, composition and extrusion conditions, were described mathematically by both the log-normal and Rosin-Rammler distribution functions. The distribution, mean size, degree of skewness or the corresponding distribution functions constants, were characteristic of the extrudate type and its particular cellular structure. AS

2424

Jager (T), van Zuilichem (DJ), de Swart (JG) and van't Riet (K). **Residence time distributions in extrusion-cooking: Part 7 - Modelling of a co-rotating, twin-screw extruder fed with maize grits.** *Journal of Food Engineering* 14(3): 1991: 203-239

The residence time distribution (RTD) of an APV-Baker MPF-50 type co-rotating, twin-screw extruder is measured by a radiotracer technique. Measurements are made with various barrel temp. profiles, feed rates, screw speeds and positions of the barrel valve. The accuracy for the measurement of the av. residence time and the curve width indicators used are within 1%. The measurements are analysed by stepwise regression and compared with a simulation model. A small but systematic deviation between model and measurements can be explained as a stagnation in the kneading elements. The occurrence of this deviation is calculated and discussed with the help of measurements with model liquids in a full-size transparent perspex model. The deviation can be modelled by separate flow systems with different mixing properties or by the introduction of dead volumes. The numerical model can be used as a 'standard' RTD model for

both co- and counter-rotating, twin-screw extruders. AS

2425

Macku (C) and Shibamoto (T). **Volatile antioxidants produced from heated corn oil/glycine model system.** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 1990-1993

The headspace volatiles collected from a mixture consisting of corn oil and glycine heated at 180 C were found to inhibit the aldehyde/carboxylic acid turnover using a newly developed antioxidation test. Among 6 column chromatography fractions of the headspace extract, the fraction that contained 1-methylpyrrole and several of its 2-alkyl homologues was found to show a significant antioxidative effect. Authentic 1-methylpyrrole also exhibited antioxidative activity that increased with the presence of pyridine. The antioxidative strength (wt. basis) of 1-methylpyrrole was comparable to that exhibited by α -tocopherol. AS

2426

Barl (B), Biliaderis (CG), Murray (ED) and MacGregor (AW). **Combined chemical and enzymic treatments of corn husk lignocellulosics.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 195-214

Corn flour

2427

Kulshrestha (K), Mishra (DP) and Chauhan (GS). **Physical and chemical characteristics of maize flour made after lime cooking of grains.** *Journal of Food Science and Technology (India)* 29(5): 1992: 284-286

Physical and chemical characteristics of maize flour cooked with lime water (LHT), water (HT) and raw (UT) were studied. LHT afforded the finest flour among the three treatments as reflected by the optimum water absorption and the particle size index (PSI). Water absorption capacity of maize flour increased significantly after LHT. The α -amylase susceptibility was highest in lime treated flour. The contents of total ash and crude protein of maize flour increased whereas those of crude fibre, fat and carbohydrates decreased after lime as well as heat treatments. AS

Panicum melinis

2428

Stringheta (PC), Bobbio (PA) and Bobbio (FO). **Stability of anthocyanic pigments from Panicum melinis.** *Food Chemistry* 44(1): 1992: 37-39

Cyanidin-3-caffeoarylabinosylglucoside and non-acylated cyanidin-3-glycoside were identified as the 2 major pigments from the inflorescences. The stabilities in both light and dark of the partially pure pigments, the pure pigments and of the crude extract of *P. melinis* at pH 2.0. Light strongly affected stability of all in the decreasing order of instability-partially purified anthocyanins, crude extract, pure anthocyanins but they all showed good stability in the dark. SD

Proso millet

Proso millet starch

2429

Yanez (GA), Walker (CE) and Nelson (LA). **Some chemical and physical properties of proso millet (*Panicum miliaceum*) starch.** *Journal of Cereal Science* 13(3): 1991: 299-305

Proso millet starch extracted from 4 cvs had an apparent amylose content slightly higher (29.2 - 32.6%) than that of normal maize. Proso starch digestibility was similar to that of maize. Gelatinization temp. and enthalpy values for proso starch were found to be significantly higher, ($P < 0.05$) than those of maize, suggesting that proso starch has a more ordered and uniform granular structure. The freeze-thaw stability of proso starch gels was less than that of maize starch, but the proso starch gels demonstrated an unusual ability to re-absorb water. AS

PULSES

Cowpeas

2430

Okechukwu (PE), Rao (MA), Ngoddy (PO) and McWatters (KH). **Firmness of cowpea gels as a function of moisture and oil content, and storage.** *Journal of Food Science* 57(1): 1992: 91-95

Cowpea gels (CPG) produced with cold-mixed cowpea flour slurry (CPFS) showed large firmness gradients. Firmness gradients of CPG were small when the cowpea flour slurries were hot-mixed and held for 30 - 60 min at 70°C; the gradients decreased with increase in fat, moisture, and salt contents; it increased with storage and the increase was higher at lower storage temp. SRA

Faba beans

Faba bean flour

2431

Shashi Gaur, Sharma (YK), Bera (MB) and Keshervani (GP). **Nitrogen solubility of raw and autoclaved faba bean flour.** *Journal of Food Science and Technology (India)* 29(5): 1992: 286-288

Nitrogen solubilities of raw and autoclaved faba bean flour, over 1 - 13 pH range and in 3 dispersion media (water, 0.1 M NaCl and 1.0 M NaCl), indicated increase below and above the isoelectric pH (4.4). Higher salt concn. reduced N solubility. Analysis showed that pH is the primary determinant of N solubility. AS

Lupines

2432

Camacho (L), Sierra (C); Marcus (D), Guzman (E), Campos (R), von Baer (D), Trugo (L). **Nutritional quality of lupine (*Lupinus albus* cv. Multolupa) as affected by lactic acid fermentation.** *International Journal of Food Microbiology* 14(3/4): 1991: 277-286

The effects of selected NRRL strains of *Lactobacillus acidophilus*, *L. buchneri*, *L. cellobiosus* and *L. fermentum* upon oligosaccharide, phytate and alkaloid contents, as well as on the nutritive value of lupine, were investigated. Lupine was processed to a 12% total solids suspension, inoculated with 1% (v/v) cultures and fermented until a final desired pH of 4.5. *L. acidophilus* B-2092 and *l. buchneri* B-1837 growth was related to a significant sucrose breakdown and decreases of phytates, whereas *L. acidophilus* B-1910 and *l. fermentum* B-585 reduced the content of flatulence oligosaccharides. The activity of *L. acidophilus* B-1910 was particularly associated with lowering of alkaloids and increase of riboflavin. Lactic acid fermentation produced slight changes in lysine and methionine contents. No significant differences in net protein ratio values and protein digestibility were found between fermented and unfermented lupine ($P < 0.05$). A 1:1 ratio mixture of B-1910 and B-2092 strains of *l. acidophilus* lead to a final fermented lupine with nutritional advantages to those given by the individual cultures. AS

Prosopis

2433

Odibo (FJC), Ugwu (DA) and Ekeocha (DC). **Microorganisms associated with the fermentation of *Prosopis* seeds for Ogiri-okpei production.** *Journal of Food Science and Technology (India)* 29(5): 1992: 306-307

Microorganisms associated with the fermentation of *Prosopis* seeds for the production of Ogiri-okpei were identified as *Bacillus subtilis*, *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Enterobacter cloacae* and *Lactobacillus plantarum*. The pH of the fermenting seeds dropped to 5.0 while temp. rose to 38 C at the end of fermentation. AS

Red beans

2434

Cho (Y) and Park (K). **Purification of cellulase from *Fusarium moniliforme* and its application to the production of red bean starch precipitate.** *Journal of Food Biochemistry* 15(4): 1991: 295-313

To investigate the effect of cellulase on increase of recovery of red bean starch precipitate, cellulases from *Fusarium moniliforme* were purified and applied to the production of red bean starch precipitate. One β -glucosidase, two filter paper degradation enzymes (FPase), one endo- β -glucanase (endo-Cx) and one exo- β -glucanase (exo-Cx) were purified by ammonium sulphate fractionation, gel filtration and ion-exchange chromatography. Optimum temp. and time of submersion of red beans for reduction of hardness was 50 C and 2 h. Max. sedimentation rate of starch was obtained when the red bean was incubated in a mixture of 0.004 units/mL of FPase and 0.3 units/mL of CMCase, and max. recovery of red bean starch precipitate was obtained with 0.004 units/mL of FPase and 0.2 units/mL of CMCase. Enzyme treatment reduced suspended solids about 40% in waste water compared with control. A little hydrolysis in cell wall, intercellular space and interstarch granular space was observed. AS

Red kidney beans

2435

Ahn (JK), Sen (LC) and Whitaker (JR). **Stability of tertiary structure of phaseolin of red kidney bean (*Phaseolus vulgaris*) as limiting factor in proteolysis.** *Journal of Food Biochemistry* 15(4): 1991: 263-278

The major storage protein, phaseolin, of red kidney bean (Linden var.) was purified by ammonium sulphate fractionation between 3 and 4.1 M. It was composed of 3 subunits with MW 49,000, 45,000 and 42,000 and there were no disulphide bonds. Phaseolin was treated with heat (121 C, 15 min), pH (1.0, 7.5, 9.0), urea (2 to 10 M), guanidine (3 to 8.5 M) and alkali (0.02 N NaOH) at 35 C to destabilize the tertiary structure. Increase of *in vitro* proteolysis by the prior treatments was estimated with

chymotrypsin, trypsin, pepsin and pronase. Native phaseolin was more resistant than Hammarsten casein to hydrolysis by chymotrypsin, trypsin, pepsin and pronase. An equimolar mixture of chymotrypsin and trypsin gave lower proteolysis than the sum of hydrolysis by each proteinase separately. Chymotrypsin hydrolysis products of phaseolin inhibited trypsin, and trypsin hydrolysis products of phaseolin inhibited chymotrypsin. All the treatments listed above enhanced *in vitro* proteolysis. Phaseolin treated with 0.02 M NaOH had higher hydrophobicity and higher absorbance between 240 and 350 nm than native phaseolin, indicating that its tertiary structure was destroyed. Autoclaving at pH 7.5, treatment with 8.5 M guanidine or with 0.02 M NaOH increased the extent of proteolysis of phaseolin to a similar or higher level than Hammarsten casein. Guanidine (8.5 M) destroyed the tertiary structure of phaseolin sufficiently that almost all susceptible bonds were hydrolyzed by pepsin, chymotrypsin and trypsin (and probably pronase). AS

OILSEEDS AND NUTS

Bambarra groundnut

2436

Ojimelukwe (PC) and Ayernor (GS). **Oligosaccharide composition and functional properties of flour and starch isolates from four cultivars of bambarra groundnut seeds.** *Journal of Food Science and Technology (India)* 29(5): 1992: 319-321

Proximate composition of flour and starch isolates of Bambarra groundnut seeds, showed that whole seeds contained 19 - 22% protein, 6-9% fat, 53-56% total carbohydrates and 4-12% soluble carbohydrates. Flatulent sugars as revealed by chromatography ranged from 1.0 to 2.6%. Water holding capacities of cvs varied between 4.0 and 7.2 g of water/g of flour. Brabender amylograph indicated that starch gelatinized between 65 and 74 C, formed stable paste and showed moderate swelling capacity. AS

Cashew nuts

2437

Shobha (SV) and Ravindranath (B). **Supercritical carbon dioxide and solvent extraction of the phenolic lipids of cashew nut (*Anacardium occidentale*) shells.** *Journal of Agricultural and Food Chemistry* 39(12): 1991: 2214-2217

Supercritical carbon dioxide extraction of raw cashew nut shells yielded 18.7% by wt. phenolic

lipids in 17.5 h. Composition of the cashew nut shell liquid (CNSL) thus obtained was quantitatively analyzed using high-performance reversed-phase liquid chromatography. The analytical data were compared with those of solvent-extracted CNSL from India (both raw cashew nuts and steam-processed cashew nuts), Brazil, Kenya, and Mozambique. Indian CNSL is richer (by about 10%) in anacardic acids, and extraction by supercritical carbon dioxide yields a better quality product. Steam-processed cashew nut shells retain about 80% of the anacardic acids. AS

Coconuts

2438

Mathew (AG). Processing of coconut in India. *Journal of Plantation Crops* 19(2): 1991; 183-190

Chemical composition of coconut and the uses of coconut, oil and coconut water are reviewed. Other aspects covered are drying of coconut, milling of copra and production of desiccated coconut. 11 references. BV

Cottonseeds

Cottonseed products

2439

El-Nockrashy (AS) and El-Shattony (Y). **Phospholipid constitution of cottonseed products during different processing operations.** *Grasas y Aceites* 41(4-5): 1990; 342-346

Cooking of cottonseed increased the phospholipid content of the oil. As a result of hydraulic pressing HP, prepressing and solvent extraction SE operations, the percentages of phospholipids in the retained oils are always higher than that found in the recovered crude oils. Crude HP oils contain less than half the amount found in the oils extracted from the cake. Crude SE oils contain higher phospholipid percentages than crude HP oils. The refining operation results in freeing the crude oils from the greater part of the phospholipids. Although the percentages of individual phospholipids in the oils differ with the nature of the samples, yet they bear more or less the same ratio to one another. The average percentages of all samples are: phosphatidyl inositol 9.3, lysolecithin 5.7, phosphatidyl serine 20.2, lecithin 26.3, phosphatidyl ethanolamine 17.7 and an unknown phospholipid 12.7. AS

Groundnuts

2440

Marshall (HFJr), Ross (LF), Conkerton (EJ), Chapital (DC) and Kvien (CK). **Effect of diniconazole on the free amino acids and carbohydrates of peanut, *Arachis hypogaea* L.** *Oleagineux* 46(8/9); 1991; 329-332

Linseed

2441

Susheelamma (NS), Naginchan and Rajalakshmi (D). **Modelling the gelling behaviour of linseed polysaccharide.** *Journal of Texture Studies* 22(4); 1991; 413-421

The gelling behaviour of linseed polysaccharide was measured in the presence of sucrose as a function of both polysaccharide and sucrose concn. Yield stress, consistency index, and flow behaviour index were determined using the Herschel-Bulkley model. Transition concn. of 0.7% for the polysaccharide and 55% for sucrose were found. Yield stress and consistency index increased with both polysaccharide and sucrose concn. while flow behaviour index decreased. A polynomial model of the third degree on centred data after natural log transformation was found to give a satisfactory fit for the variations in rheological constants. The models for both yield stress and consistency index were a complex power law, and for flow behaviour index a complex semi-log relationship, on sucrose and polysaccharide concn. AS

Rapeseeds

2442

Lange (R) and Linow (F). **About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part 5. Determination of total glucosinolate content via glucosinolate-palladium-complex.** *Die Nahrung* 35(4); 1991; 379-384 (De)

Aspects of palladium-glucosinolate-complex formation are studied with regard to the detn. of total glucosinolate content. With standards the absorption behaviour of the palladium-complexes is examined in dependence on the structure of the glucosinolates. Glucosinolate mixtures from seeds of different Cruciferae are classified with reference to the differences in the absorption data of their palladium complexes. The classification leads to groups of substrates corresponding to the dominant glucosinolates and the genotypes of the seeds. It is recommended to analyse simultaneously substrates of the same group only. The usefulness of the substrate classification is documented by the analysis of seeds from rape var. AS

2443

Lange (R), Petrzika (M), Raab (B) and Linow (F). **About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part 6. Estimation of glucosinolates by HPLC-mass spectrometry.** *Die Nahrung* 35(4): 1991: 385-389 (De)

The estimation of glucosinolates in rape seeds by HPLC-thermospray MS is discussed. The chromatographic separation parameters (relative response time) of these compounds and the characteristic ions in the thermospray mass spectra are described. The applicability of the procedure is checked by the analysis of the glucosinolate pattern from seeds of licensed rape var. AS

Sesame

2444

Yuno-Ohta (N), Maeda (H), Okada (M) and Hasegawa (K). **Formation of transparent gels of sesame 13S globulin: Effects of fatty acid salts.** *Journal of Food Science* 57(1): 1992: 86-90

The physicochemical properties of sesame 13S globulin gels containing fatty acid salts (FAS) were investigated. The softness, water-holding ability (WHA) and transparency of the gels markedly increased in the presence of sodium oleate (NaC_{18:1}) or sodium linoleate (NaC_{18:2}) at a 75 molar ratio to a molecule of the 13S globulin. The effect was not observed by the addition of sodium caprylate (NaC_{8:0}). Scanning electron microscopy showed that a very fine network structure was formed in the gel with 75 molar ratio of NaC_{18:2}. The addition of a suitable amount of FAS having a moderate length and an unsaturated carbon chain could improve the WHA and transparency of the 13S globulin gel. AS

Soybeans

2445

Mishra (HN) and Mukherjee (RK). **Effect of temperature and surface area on drying of dehulled and water-blanching soybeans.** *Journal of Food Science and Technology (India)* 29(5): 1992: 318-319

Surface area of the blanched soybean (BS) splits (*dhals*) increased two folds by flaking, thereby reducing the drying time by half. Mechanical drying (MD) was found to be better than sun-drying. The rate of drying seemed to increase with temp. MD at 60°C for 4 h for unflaked sample and for 2 h for flaked sample were found suitable for the drying of dehulled and BS for milling. AS

Soy flour

2446

Pallavi Sharma, Chauhan (GS), Pratima Awasthi and Usha (MS). **Texture profile and consumer acceptability of defatted soy flour substituted traditional foods.** *Journal of Food Science and Technology (India)* 29(5): 1992: 322-323

The substitution of chickpea flour with defatted soyflour (DSF) at 25% level did not significantly alter breaking strength of *Murukku*, (snack) but had a significant effect on the breaking strength of *Nankhatai*. Bulk density of DSF-substituted *Mysore Pak* (sweet preparation) was higher than the bulk density of *Mysore Pak* prepared from chickpea flour. Consumer acceptance tests showed that the products were well accepted. AS

Soy products

2447

Funk (MA) and Baker (DH). **Effect of soy products on methotrexate toxicity in rats.** *Journal of Nutrition* 121(10): 1991: 1684-1692

Several exp. were conducted to determine the effect of various soy products on methotrexate (MTX) toxicity. Products tested included soybean meal, soybean concentrate, soybean isolate and soybean fiber, which were provided as replacements for casein or corn starch in a semi-purified diet. Soybean meal and soybean concentrate offered the greatest protection, completely alleviating MTX-induced anorexia and diarrhea when included as the sole protein source and fed 14 days prior to and 7 days following intraperitoneal MTX injection at 20 mg/kg body wt. Positive responses also were observed with soybean isolate and soybean fiber. Histological examination of the small intestine of MTX-injected animals revealed that soybean concentrate and soybean isolate prevented the necrosis observed in animals fed the casein-based semi-purified diet. Methotrexate levels in plasma were similar for animals fed semi-purified diets in which protein was supplied by casein, soybean concentrate or soybean isolate. Thus, altered plasma MTX levels did not explain the differences among protein sources in ameliorating MTX-induced anorexia and gut toxicity. White blood cell counts were depressed by MTX in animals fed all diets. AS

Paneer

2448

Anjali Jain and Mital (BK). **Quality characteristics of paneer prepared from different varieties of**

soybean. Journal of Food Science and Technology (India) 29(5); 1992; 298-300

Eight soybean var. were used to study the quality characteristics of soy paneer. The protein content of the var. was significantly correlated with protein content of soy milk ($r = +0.92$) and soy paneer ($r = +0.76$), respectively. However, no significant correlations between (i) protein content of the bean and paneer yield, (ii) protein content of the bean and its % recovery in the product were observed. The moisture content of the product significantly influenced its porosity ($r = +0.96$) and shear strength ($r = -0.99$). Deep-fat-frying (180 C for 8 min) substantially reduced moisture content of the product and enhanced its fat content. On sensory qualities, paneer prepared from 'Pb-1' var. was superior to paneer prepared from other varieties. AS

Soy milk

2449

Nsofor (LM) and Anyanwu (KB). **Development and evaluation of concentrated soy milk beverage. Journal of Food Science and Technology (India) 29(5); 1992; 331-332**

A concentrated soy milk beverage of 32% total solids content was developed using soybean extract, palm kernel oil, sucrose, trona extract (a local emulsifier and tenderizer) and water. Sensory evaluation of the beverage in a preference test showed consumer acceptance of the beverage in contrast to the preference for the evaporated milk var. Male panelists scored significantly ($\alpha = 0.05$) higher overall mean acceptance scores for the milk products and soy beverage than females. Development of a low cost soy-based evaporated cow milk analogue thus may be feasible. AS

Soy-yoghurts

2450

Nsofor (LM) and Chukwu (EU). **Sensory evaluation of soy milk-based yoghurt. Journal of Food Science and Technology (India) 29(5); 1992; 301-303**

Soy yoghurt (SY) with improved sensory characteristics was prepared from a base that consisted of 22% soybean solids, 4% sucrose, 2% corn starch, 0.3% sodium citrate, water and fermented with 5% active mixed starter culture (*Lactobacillus bulgaricus* and *Streptococcus thermophilus*). Comparative sensory evaluation of cow milk yoghurt and improved SY produced 9 point mean Hedonic scores of 6.2 and 5.9 for overall acceptability which were insignificantly different (α

$= 0.01$). 73% of the respondents rejected SY as an alternative to cow milk-based yoghurt. AS

TUBERS AND VEGETABLES

Cassava

2451

Badrie (N) and Mellowes (WA). **Cassava starch or amylose effects on characteristics of cassava (*Manihot esculenta* Crantz) extrudate. Journal of Food Science 57(1); 1992; 103-107**

Blends of cassava flour (CF) with cassava starch (CS) or amylose were processed on a Wenger X-5 lab. extruder. CS added to CF increased total carbohydrate in feed, reducing yellow colour, water absorption and extrudate bulk density but increased expansion, product moisture, water solubility and total reducing sugars. Amylose addition increased extrudate surface regularity with reduced water solubility, total reducing sugars, and bulk density. Expansion was highest in mixtures containing 60% amylose. Textural properties of extrudate increased on addition of amylose or CS. Differences in microstructures existed between CF and CS extrudate. AS

2452

Okolie (NP), Ibeh (IN) and Ugochukwu (EN). **Production of improved cassava fufu, 'akpu', through controlled fermentation. Food Chemistry 44(2); 1992; 137-139**

Controlled fermentation of cassava tuber using starter culture consisting of *Citrobacter freundii*, *Geotrichum* spp., *Candida* spp. and *Saccharomyces* spp. yielded the most acceptable product 'akpu' with respect to odour and residual cyanide ($P < 0.05$; $P < 0.01$ in some cases). 'Akpu' from traditional fermentation has significantly higher protein ($P < 0.01$) and lowest HCN than the product of controlled fermentation; but the product was not acceptable due to its odorous property. BV

Cassava flour

2453

Badrie (N) and Mellowes (WA). **Soybean flour/oil and wheat bran effects on characteristics of cassava (*Manihot esculenta* Crantz) flour extrudate. Journal of Food Science 57(1); 1992; 108-111**

Adding 25% soybean flour (SF) to cassava flour (CF) increased crude protein % from 1.38 plus or minus

0.02 to 14.98 plus or minus 0.06. The addition of 12% wheat bran to CF, the % crude fiber increased from 1.68 plus or minus 0.02 to 3.38 plus or minus 0.03. Differences in the % of crude protein and crude fiber between the pre-extrusion blends and extrudates at various levels were insignificant. The reducing sugars in 100% CF increased from 2.1 plus or minus 0.10 (preextrusion blend) to 21.95 plus or minus 0.20 (extrudate) on extrusion processing. The lowest water absorption and highest water solubility of extrudate were obtained on 4% addition of soybean oil. Extrudates containing 25% SF differed from 100% CF extrudates by 11.68 colour units. Extrudates appeared most yellow (3.41 y 6.50/2.44) on addition of 4% soybean oil. SRA

Potatoes

2454

Becker (R) and Gray (GM). **Evaluation of a water jet cutting system for slicing potatoes.** *Journal of Food Science* 57(1): 1992; 132-137

The parameters studied were water pressure, nozzle orifice diam., cutting speed and the resulting calculated depth of subsurface cellular damage. When samples were cut at a speed of 3.0 MPM, the least subsurface cellular damage occurred with the 0.076 mm orifice, regardless of the water pressure used. Subsurface damage increased as orifice diam. increased to 0.229 mm. Intermediate water pressures were associated with more subsurface cellular damage than the highest or lowest pressures. French fries cut with the waterjet set to cause intermediate subsurface damage had increased colour irregularities but no extreme taste or textural differences were observed compared to conventionally cut control samples. SRA

2455

Wang (N) and Brennan (JG). **Moisture sorption isotherm characteristics of potatoes at four temperatures.** *Journal of Food Engineering* 14(4): 1991; 269-287

Moisture equilibrium data of potatoes by desorption and adsorption were determined at 40, 50, 60 and 70 C. The experimental procedure was a gravimetric method. Isosteric heats of water desorption and adsorption were calculated by applying the Clausius-Clapeyron equation to the sorption isotherms at different temp. Seven mathematical models were used to fit the experimental data. A nonlinear least-squares regression program was used to evaluate the constants of the seven desorption and adsorption isotherm models. AS

2456

Gekas (V) and Lamberg (I). **Determination of diffusion coefficients in volume-changing systems - Application in the case of potato drying.** *Journal of Food Engineering* 14(4): 1991; 317-326

This work was based on a modified Crank approach in order to determine the diffusion coeff. in systems where volume changes occur during drying. The modified model was applied to the case of potato drying, for both raw and blanched potatoes, at two temp.: 60 and 80 C. The degree of volume change (shrinkage) was different for raw and blanched potatoes, but only small differences have been observed for the diffusion coeff. of reference, which was evaluated at $2.25 \text{ (plus or minus } 0.13) \times 10^{-10} \text{ m}^2/\text{s}$ for raw potatoes and $2.48 \text{ (plus or minus } 0.28) \times 10^{-10} \text{ m}^2/\text{s}$ for blanched potatoes. AS

2457

Temple (VJ), Ojobe (TO) and Onobun (CE). **Chemical composition of Livingstone potato tubers (*Plectranthus esculentus*).** *Journal of the Science of Food and Agriculture* 56(2): 1991; 215-217

Chemical analysis of Livingstone potato tubers show crude protein, crude lipid and total carbohydrate values of 63.5 g kg^{-1} , 26.3 g kg^{-1} and 854.0 g kg^{-1} DM respectively. The trace element content of the tubers was Fe 25.6 mg kg^{-1} , Cu 5.0 mg kg^{-1} , Pb 0.39 mg kg^{-1} and Zn 10.0 mg kg^{-1} DM. The levels of threonine (4.48 g per 16 g N) and phenylalanine (3.34 g/16 g N) in the tubers are higher than the FAO reference values from 1970. AS

2458

Pizzoferrato (L). **Examples of direct and indirect effects of technological treatments on ascorbic acid, folate and thiamine.** *Food Chemistry* 44(1): 1992; 49-52

From the effects of sulphiting agents in thiamine and folic acid levels in treated potatoes and that of industrial pasteurization on ascorbic acid content of cow's milk, an interesting double effect of processing - 'direct' against vitamin stability and 'indirect' against natural vitamin antagonists is suggested leading to the hypothesis that in processed foods the residual levels of vitamins should depend on the equilibrium between the effects. SD

Sweet potatoes

2459

Walter (WWJr), Fleming (HP) and McFeeters (RF). **Firmness control of sweet potato French fry-type product by tissue acidification.** *Journal of Food Science* 57(1): 1992; 138-142

The softening of French fry-type product prepared from 'Jewel' sweet potatoes decreased when the tissue pH was lowered from Ca 6 to 3.8 prior to blanching. When ionic strength of the acidulant sol. was increased to 0.3 or more with NaCl, firmness retention was lowered. This process could possibly be used as a means to control textural properties of other types of sweet potato products. SRA

Sweet potato starch

2460

Kohyama (K) and Nishinari (K). **Cellulose derivatives effects on gelatinization and retrogradation of sweet potato starch.** *Journal of Food Science* 57(1): 1992; 128-131, 137

Effects of physically or chemically modified celluloses on gelatinization and retrogradation of sweet potato starch were examined by rheological measurements and differential scanning calorimetry. The mixture of sweet potato starch and 4 modified celluloses (powdered microcrystalline cellulose, alkaline soluble fibrous cellulose, carboxymethylcellulose and methylcellulose) in the ratio of 9 to 1 was used as a model, because that ratio of starch to cellulose is about the same for sweet potato root. Cellulose derivatives generally did not show important effects on gelatinization temp. and enthalpy of gelatinization. Cellulose derivatives which are not water-soluble increased starch retrogradation, while water-soluble methylcellulose unexpectedly prevented retrogradation. AS

Vegetables

2461

Gnanasekharan (V), Shewfelt (RL) and Chinnan (MS). **Detection of colour changes in green vegetables.** *Journal of Food Science* 57(1): 1991; 149-154

The sensitivity of colorimetry and sensory evaluation for detn. of postharvest colour changes in broccoli (B), cucumber (C), spinach (S) and tomato (T) was studied at normal (10 C for C and T, 4 C for B and S) and abuse (37 C for C and T, 21 C for B and S) temp. Both techniques resolved major colour changes but failed to detect changes under normal storage temp. With significant colour changes, both methods exhibited similar patterns. The sensitivity of detection of colour changes in green vegetables should be determined before measuring such changes during storage. AS

2462

Dikshith (TSS), Mishra (VK), Joshi (DD), Srivastava (MK) and Raizada (RB). **Organochlorine insecticide residues in vegetables of Lucknow market in India.** *Journal of Food Science and Technology (India)* 29(5): 1992; 335-337

Vegetables collected from Lucknow were found contaminated with organochlorine insecticides (OI) such as HCH, DDT, aldrin and endosulfan. Among these, the concn. of HCH was highest (0.0638 - 0.4908 p.p.m.) followed by DDT (0.0012 - 0.1068 p.p.m.) and aldrin (0.0012 - 0.0486 p.p.m.). Trace amounts of endosulfan ranging from 0.00005 - 0.0009 p.p.m. were present in all the vegetables. The residue levels of OI in different vegetables analysed were below the max. permitted residue limits. AS

2463

Komaitis (ME), Ifanti-Papatragianni (N) and Passaloglou-Emmanoulidou (S). **Chlorophyll and pheophytin changes in some frozen vegetables during storage.** *Grasas y Aceites* 41(4-5): 1990; 371-373

The chlorophyll and pheophytin contents of frozen samples of okra and green beans were measured according to the method of Vernon. The effect of time and temp. of storage was also studied. The chlorophyll loss was considerable for samples stored at -5 C for 3 months. At -11 and -18 C the chlorophyll was retained for longer periods of time (up to 6 months), while at -30 C the chlorophyll loss was insignificant. Samples stored at -30 C kept their colour even after 7 months of storage. Intermediate temp. (-18 to -30 C) seems to offer a good alternative for the storage of okra and green beans. AS

Cucumbers

2464

Rodrigo (M), Lazaro (MJ), Garcia (G), Conesa (F) and Safon (J). **Pilot study of cucumber fermentation: Diffusing gases and bloater damage.** *Journal of Food Science* 57(1): 1992; 155-160

A pilot study was made of the effect of temp. (17 and 26 C) and purging, with N (5 - 20 L/h applied continuously and intermittently) or air (20 L/h for 7 h/day), on the development of fermentation and on the incidence of bloater damage in cucumbers. Temp. affected the rate of fermentation and both temp. and purging strongly affected the incidence of bloater damage. At 17 C purging was not necessary, and at 26 C 10 L/h was sufficient, applied for 7 h/day for 7 days. AS

Tomatoes

2465

Hawlader (MNA), Uddin (MS), Ho (JC) and Teng (ABW). **Drying characteristics of tomatoes.** *Journal of Food Engineering* 14(4): 1991: 259-268

In this investigation, the drying characteristics of tomatoes have been studied under various operating conditions. A drier was built for exp. under controlled conditions. Exp. were conducted with different air temp. and flow velocities to determine the drying characteristics of tomato. A diffusion model was used to study the drying of sliced tomato specimens. Shrinkage was observed and this effect was taken into account in the basic diffusion model through the use of a power law expression that related apparent shrinkage to moisture content. Analysis of experimental data yielded correlations between the effective diffusivity and both temp. and air velocity. An equation was also developed to estimate the drying time to reach a particular moisture level. AS

Tomato paste

2466

Aziz (NH), Farag (S) and Hassanin (MA). **Effect of gamma irradiation and water activity on mycotoxin production of alternaria in tomato paste and juice.** *Die Nahrung* 35(4): 1991: 359-362

γ -irradiation (4 kGy level) of tomato paste and juice significantly or completely inhibited the production of tenuazonic acid (TZA) by *Alternaria alternata*. Only trace amount of TZA was detected at 0.98 aw (1.50 $\mu\text{g/g}$) by 3 kGy-irradiated conidia in tomato paste, while it was inhibited completely in juice. Increasing γ -irradiation doses and decreasing aw decreased greatly or inhibited TZA production in both tomato paste and juice. BV

FRUITS

2467

Voldrich (M) and Kyzlink (V). **Cyanogenesis in canned stone fruits.** *Journal of Food Science* 57(1): 1992: 161-162, 189

Glycoside contents were determined in seeds and pulp of several sp. and cvs of fresh fruits. Highest amounts were found in morello cherries, and lowest in some cvs of apricots. Cvs with a higher concn. of glycosides in seeds usually also contained higher amounts in pulp. The most important factors affecting the hydrogen cyanide (HCN) content in the edible portion of canned stone fruits were glycoside

content in raw fruits and the course of heat treatment. Enzymatic hydrolysis of glycoside during heat processing is the major source of the evolved HCN. Fruits with low glycoside content should be chosen for processing without stoning. If necessary to process unstoned fruit with higher glycoside content, HTST treatment should be used. SRA

2468

Sahbaz (F) and Scmer (G). **Determination of ascorbic acid in fruit and vegetable using normal polarography.** *Food Chemistry* 44(2): 1992: 141-146

A method is presented in which ascorbic acid can be determined easily by the polarographic technique. The principal advantages with this method are its specificity, comparative rapidity and applicability to highly coloured sol. It is also straightforward with easy sample preparation steps, low reagent consumption and time saving. In addition it does not require expensive instrumentation. Thus these features make it suitable for analysis of vitamin C in fruits and vegetables. BV

2469

Anon. **Net isosteric heat of sorption in dried fruits.** *Journal of Food Engineering* 14(4): 1991: 327-335

In this work, the net isosteric heats of sorption ($q_{st,n}$) of 5 dried fruits (Sultana raisins, currants, figs, prunes and apricots) were determined for adsorption and desorption, using the relevant thermodynamic relation, (i.e. Clausius-Clapeyron equation) in the temp. range 15-60 C, based on the experimental sorption data. From the results, several mechanisms are proposed for the sorption of water in dried fruits with high sugar content. The high value of $q_{st,n}$ in the initial stages of adsorption, and its steep decrease in the moisture content range 4-8% dry basis, suggest a monomolecular physical sorption on highly active polar sites. In the moisture content range 10-25%, the sorption occurs in multilayers on less active sites, and there is a slight dissolution of sugars in the water. In the range 25-40% dry basis, there is an increased dissolution of sugars and a weaker sorption on active sites. Finally, at moisture contents above 40%, complete dissolution and extrusion of sugars and the plasticization of biopolymers takes place. AS

Grapefruits

2470

Ericson (AP), Matthews (RF), Teixeira (AA) and Moye (HA). **Recovery of grapefruit oil constituents from processing waste water using**

styrene-divinylbenzene resins. *Journal of Food Science* 57(1); 1992; 186-189

Styrene-divinylbenzene (SDVB) resins were utilized for the recovery of coldpressed grapefruit oil constituents from model sol. and waste waters. Sorption rates and sorption capacities were determined for a series of resins with model sol. Citrus oil processing waste water was passed through an upflow column extraction system. Adsorbed oil was desorbed using 95% ethanol and GC analysis was performed to determine the quality of the extracted oil. The waste water samples contained suspended solids which reduced the extraction ability of the resins. Major compounds recovered from waste waters were d-limonene and α -terpineol. Nootkatone and linalool recovery levels varied, while octanol and decanal were present in extremely low levels in the recovered products. AS

Grapes

2471

Gonzalez-Sanjose (ML) and Diez (C). **Relationship between anthocyanins and sugars during the ripening of grape berries.** *Food Chemistry* 43(3); 1992; 193-197

The sugars in the must of 2 var. of red grapes showed direct relationship to the total anthocyanins and to the derivatives of peonidin. The sugars in the skin showed close relationship with the anthocyanins and to other phenolic compounds. SD

Mangoes

2472

Pradnya Kanekar, Seema Sarnaik and Neeta Joshi. **Sugar and acid tolerant microorganisms causing spoilage in mango jam (Muramba).** *Journal of Food Science and Technology (India)* 29(5); 1992; 278-280

Microorganisms isolated from home made mango jam (muramba) samples belonged to 11 bacterial and 2 fungal species. Physiological studies of the isolate with respect to tolerance to sucrose and citric acid incorporated in synthetic medium showed growth at 78% sucrose and 24.5% citric acid by *Aspergillus niger* followed by *Penicillium* sp. (66% sucrose and 18% citric acid), *Bacillus laterosporus* and *Staphylococcus saprophyticus* (70% sucrose and 24.5% citric acid respectively). This forms the first report of these sp. for sugar tolerance. When artificially inoculated, *Asp. niger* and *Penicillium* sp. caused spoilage in muramba samples with 60% sugar and boiled for 30 and 40 min but not in samples with 70 and 80% sugar and boiled for 30 min. AS

2473

Ramteke (RS), Dhanaraj (JS) and Eipeson (WE). **Sensory quality studies on mango aroma concentrate during storage.** *Journal of Sensory Studies* 6(3); 1991; 193-203

The aroma stripped 'Alphanso' and 'Totapuri' mango pulp concentrates were canned as such and after mixing with 50% aroma concentrates and stored at 25 plus or minus 5 C. Aroma concentrates were bottled and stored at 2 C. At different intervals of 6 months storage, beverages were prepared and evaluated upto 30 days storage. Beverages prepared from mango concentrates to which 50% aroma was added before canning was superior to those prepared from aroma stripped canned pulp concentrate to which aroma was added at the time of beverage preparation. SD

2474

Joseph (K) and Aworh (OC). **Post-harvest treatment of wild mango (*Irvingia gabonensis*) for improved shelf-life.** *Food Chemistry* 44(1); 1992; 45-48

Dipping wild mangoes in hot (55 C) water or hot 0.1% benomyl, 0.5% sodium dehydroacetate or 0.5% Na₂S₂O₅ followed by waxing or packaging in boxes overwrapped with starch PVC film, delayed ripening, controlled decay, minimised wt. loss and extended the shelf-life of the fruits stored at 22 - 35 C and 70 - 95% RH without adversely affecting visual and chemical qualities. PVC film packaging preceded by a sulphite dip yielded best results. SD

Peaches

2475

Javeri (H) and Wicker (L). **Partial purification and characterization of peach pectinesterase.** *Journal of Food Biochemistry* 15(4); 1991; 241-252

Pectinesterase (EC 3.1.1.11) was extracted from peaches (*Prunus persica*) and partially purified by preparative free sol. isoelectric focusing. On SDS-PAGE gels, protein bands at 36.3 and 33.9 kilodaltons represented the major bands; minor bands were observed at 108.4, 40.7 and 17.0 kilodaltons. The pH optimum for pectinesterase activity in the partially purified extract was 8.0. The enzyme was stable at 30 C for 30 min between pH values of 5 and 8. Peach pectinesterase is stable when heated at 55 C for 5 min in 0.1 M NaCl, 50 mM sodium phosphate, pH 7, buffer. However, residual activity decreased to 23% at 65 C for 5 min and was inactivated at 70 C for 5 min. The energy of activation of peach pectinesterase was determined

to be 34,600 J/mol^oK. The Q₁₀ between 30 C and 60 C was estimated to be 1.5 - 1.6. AS

Pears

2476

Sinobas (LR), Ruiz-Alsent (M) and Jose Luis de la Plaza Perez. **Bruise development and fruit response of pear (cv. 'Blanquilla') under impact conditions.** *Journal of Food Engineering* 14(4): 1991; 289-301

Pear fruits cv. 'Blanquilla', at various ripening stages, were studied under impact conditions. A 50.6-g spherical steel indentator, with a radius of curvature of 0.94 cm, was dropped on to the fruit from 3 heights: 4, 6 and 10 cm (0.0199, 0.0299 and 0.0499 J). The variables measured were analyzed. All variables were observed to be related to the impact energy - except impact duration, which was related to the fruit firmness. Bruising correlated with impact energy when considering different heights, but not with any specific variable when studying the impact phenomenon at individual heights; however, there was a clear correlation between impact bruising and firmness. Three bruise shapes were observed, corresponding to preclimacteric, climacteric and postclimacteric fruits: a theory for this response is offered. According to the results, the impact response in postclimacteric pear fruits (with firmness values of less than 25 N, and a maturity index above 55) may be explained by the role played by the skin rather than by the pulp. AS

Pomegranates

Anardana

2477

Mahajan (BVC), Chopra (SK) and Sharma (RC). **Processing of wild pomegranate (*Punica granatum* L.) for Anardana: Effect of thermal treatments and drying modes on quality.** *Journal of Food Science and Technology (India)* 29(5): 1992; 327-328

Comparison of deep hot sand roasting of whole fruit, dry roasting on heater and blanching in boiling water for 5 min to remove fleshy seeds from wild pomegranate fruits indicated best results with the first method. The quality of the dried seeds was far superior when dried in solar drier as compared to conventional sun-drying or hot-air drying. AS

Strawberries

2478

Skrede (G), Wrolstad (RE), Lea (P) and Enersen (G). **Colour stability of strawberry and blackcurrant syrups.** *Journal of Food Science* 57(1): 1992; 172-176

Strawberry syrup (SS) plain and fortified with anthocyanins and/or ascorbic acid levels equivalent to those of blackcurrent syrup (BS) were compared for colour stability (CS). Anthocyanin pigments of unfortified strawberry syrup were less stable than those of BS. CS of SS fortified with equal anthocyanin concn. was similar to BS. Hence, CS was dependent upon total anthocyanin concn. rather than qualitative pigment composition. Ascorbic acid fortification decreased colour stability in SS whereas anthocyanin pigment fortification showed slight protective effect on ascorbic acid. SRA

2479

Carbonell (E), Costell (E) and Duran (L). **Rheological indices of fruit content in jams: Influence of formulation on time-dependent flow of sheared strawberry and peach jams.** *Journal of Texture Studies* 22(4): 1991; 457-471

Twenty three samples of each strawberry and peach fruit jam were prepared according to a second order composite rotatable design. Weltmann A values depended on fruit content and its interaction with soluble solids and added pectin. Weltmann B values depended on the 3 variables and on pectin interaction for strawberry jams while for peach jam B values on soluble solids. Predictive power of time dependent parameters for estimation of fruit content in conjunction with soluble solids and total pectin values explained 91.7% of the variability of strawberry and 83.7% in peach jams. SD

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

2480

Franke (K) and Tscheuschner (H-D). **Modelling of the continuous high shear rate conching process for chocolate.** *Journal of Food Engineering* 14(2): 1991; 103-115

An extensive analytically deduced model for energy processes is presented for the structural modification of chocolate mass during continuous conching. The transport behaviour of chocolate mass in the conching equipment in the axial direction is described by a suitable differential

equation taking into account axial mixing of the chocolate mass. For modelling of structural modification, the required power of the shearing elements dissipated in the chocolate mass, and energy required for structural modification of the chocolate mass is used. The process model obtained describes the axial temp. distribution of chocolate mass in the conching equipment. By means of the model, the energy required to modify the structure of the chocolate mass during continuous conching is determined. AS

Sweets

Gurdani

2481

Saxena (AK), Kulkarni (SG), Berry (SK), Sehgal (RC) and Beerh (OP). **Gurdani - An Indian traditional sweet: Optimum recipe for its preparation.** *Journal of Food Science and Technology (India)* 29(5): 1992; 273-275

Gurdani - an Indian traditional sweet is prepared from Bengalgram flour (besan), deep-fat-fried in the form of *sewian* and subsequently coated uniformly with jaggery (gur). Optimum conditions and recipe for the preparation of *gurdani* have been standardized. *Gurdani* is cylindrical in shape (length 11 - 66 mm, diam. 10 - 11 mm) with unit wt. ranging from 2.2 to 5.0 g. The product had attractive yellowish brown colour, soft and crisp texture, pleasant aroma and good taste peculiar to *gurdani*. The product could be stored for 3 months without losing its quality in 200 guage LDPE, 120 guage PP, 100 guage HDPE and friction-top-tins. The product, however, registered a gradual loss in moisture and a marginal rise in free fatty acid and peroxide value during the storage period. AS

Honey

2482

Vinas (P), Campillo (N), Cordoba (MH) and Candela (ME). **Simultaneous liquid chromatographic analysis of 5-(hydroxymethyl)-2-furaldehyde and methyl anthranilate in honey.** *Food Chemistry* 44(1): 1992; 67-72

The proposed method is reverse-phase gradient-elution HPLC which can be applied for routine characterization of honey based on the methyl anthranilate content and the quality control based on 5-(hydroxymethyl)-2-furaldehyde level to evidence improper processing and storage or adulteration by invert syrup. SD

Starches

2483

Chang (Y-H) and Lii (C-Y). **Preparation of starch phosphates by extrusion.** *Journal of Food Science* 57(1): 1992; 203-205

Physicochemical properties were compared on starch phosphates (SP) of cassava and corn, prepared by an extrusion process (EP) and by the conventional method (CM), as well as their native starches. Results indicated that SP prepared by EP using 4g reagent/100g starch had only slightly lower degree of substitution values than those prepared by CM using 12.6g/100g starch (db.). The SP showed similar responses to heat treatment and pH changes. The SP made by EP had lower gelatinization temp., lower enthalpies and lower paste viscosities than those prepared by CM. SRA

Sugars

2484

Sims (KA) and Cheryan (M). **Continuous production of glucose syrup in an ultrafiltration reactor.** *Journal of Food Science* 57(1): 1992; 163-166

An ultrafiltration reactor was developed for the continuous saccharification of liquefied corn starch using glucoamylase. At an enzyme concn. of 1 g/l and a substrate concn. of 300 g/l, maltose and maltotriose were still detected in the reactor permeate after 4 hr of operation. At higher enzyme concn. (6 and 12 g/l), the reactor achieved steady-state operation within 1 - 3 h at all substrate concn. studied. At an enzyme concn. of 12 g/l, residence time did not affect the final conversion of liquefied starch to glucose. The ultrafiltration reactor produced glucose syrups at residence times of 2 - 3 h and substrate concn. up to 30% w/v. AS

2485

Ananth Narayan (K) and Cross (ME). **Temperature influence on acetylysine interaction with glucose in model systems due to Maillard reaction.** *Journal of Food Science* 57(1): 1992; 206-212

The interaction between N- α -acetylysine and glucose was investigated in a dry cellulose matrix (1.8% moisture) at 40, 50 and 60 C and a_w 0.19 - 0.21. The loss in acetylysine in 6 days at those temp. was 22, 54 and 79%, respectively. The degradation data more clearly fit double exponential function ($Ae^{BX} + Ce^{DX}$) than the first order function, Ae^{BX} . An estimate of the activation energy of 36 kcal/mol and a Q_{10} of 5.5 was computed from second order rate constants for acetylysine and

glucose degradation. The increase in colour followed zero order kinetics and indicated an activation energy of 44 kcal/mol for the presumed third phase of the Maillard reaction in the solid state. AS

2486

Daillant (B) and Issanchou (S). **Most preferred level of sugar: Rapid measure and consumption test.** *Journal of Sensory Studies* 6(3): 1991; 131-144

Yoghurt samples with 13 levels of added sugar from 1.83 - 25.1 g/100 g (concen. ratio about 4:3) were evaluated by 24 consumers in 13 lab. meals on an ideal relative-rating and a consumption test. The consumption test showed that the behaviour of the 30% of subjects could not be related to the sugar level. The most preferred level of sugar obtained with the ideal relative rating was not always the most consumed. The ideal relative rating predict better the consumption behaviour. SD

BAKERY PRODUCTS

Bread

2487

Snider (M) and Leibman (M). **Calcium additives and sprouted wheat effects on phytate hydrolysis in whole wheat bread.** *Journal of Food Science* 57(1): 1992; 118-120

Whole wheat bread loaves were subjected to treatments of different fermentation periods, different sources and levels of Ca, and the addition of sprouted wheat. A 2 h leavening period produced a significantly greater mean loss in phytate than by 1 h leavening period. Nonfat dry milk caused the most significant inhibition of phytate hydrolysis among the loaf sets. The magnitude of inhibition was CaCl_2 , followed by yoghurt and CaCO_3 , respectively. Phytase activity increased during seed germination and sprouted wheat contained 24% less phytate than the 100% extracted whole wheat flour. Thus addition of sprouted wheat decreased absolute phytate losses. Comparison of phytate losses in yeasted vs non-yeasted loaves suggested that endogenous wheat phytase was quantitatively more important than yeast phytase during bread making. SRA

2488

Indrani (D) and Venkateswara Rao (G). **Effect of processing methods on the quality of whole wheat flour bread.** *Journal of Food Science and Technology (India)* 29(5): 1992; 293-295

Whole wheat flour breads based on straight dough, sponge and dough and mechanical dough development methods were prepared. The specific loaf vol. of bread from sponge and dough method was highest (2.44 cc/g) followed by the straight dough method (2.31 cc/g) and mechanical dough method (2.13 cc/g). The effect of different methods on the crumb texture of bread was distinct. The crumb texture was very soft, soft and slightly hard for breads by sponge and dough, straight dough and mechanical dough development methods, respectively. The results indicated that sponge and dough method was better suited than straight dough and mechanical dough development methods. However, the breads from different methods possessed wholesome typical wheaty taste. AS

Snacks

2489

Almeida-Dominguez (NG), Higuera-Ciapara (I), Goycoolea (FM) and Valencia (ME). **Package, temperature and TBHQ effects on oxidative deterioration of corn-based snacks.** *Journal of Food Science* 57(1): 1992; 112-117

A highly-nutritive corn-soybean-chickpea fried snack (CSCS) was packaged in LDPE and HDPE bags, and a commercial corn snack (CCS) was packaged in LDPE bags. Accelerated shelf-life test methodology was employed to study products stored at 50% RH and at 40 and 50 C. The CSCS was fried in oil containing 0.01% TBHQ antioxidants. The products had moisture absorption but did not significantly affect sensory acceptability throughout storage. The formulated snacks had a similar pattern to that of CCS with respect to chemical and sensory deterioration, but the rate of quality loss was higher in CCS. HDPE provided better protection against moisture absorption than LDPE at 40 C but the difference was negligible at 50 C. Addition of TBHQ antioxidant prolonged shelf-life regardless of film used. The use of HDPE over LDPE resulted in significantly longer shelf-life and lowest cost/day extension at ambient temp. SRA

2490

van Laarhoven (GJM) and Staal (G). **Rheology of the paste from gelatinization by extrusion during the production of third-generation snacks.** *Journal of Food Engineering* 14(1): 1991; 53-70

In an extrusion process for snacks the influence of different raw material properties and processing conditions on the viscosity of the paste and on the final snack quality was studied. Potato granules and flakes, mixed with potato starch and water, were processed in the gelatinization part of an extruder. The paste leaving this part was placed in a back

extrusion cell and the force (BEF) required to press the paste was measured. The viscosity was calculated for different shear rates using the best suited model, the power law model. The influence of raw material properties on BEF was small but moisture content and temp. had great influence on BEF and viscosity. The relations are presented in model equations. In the forming part of the extruder the paste was pressed into a pellet. After expansion by frying the final snack was evaluated by a sensory panel. Some sensory properties of the snacks are related to BEF and to process conditions. AS

Tortillas

2491

Holt (SD), Resurreccion (AVA) and McWatters (KH). **Formulation, evaluation and optimization of tortillas containing wheat, cowpea and peanut flours using mixture response surface methodology.** *Journal of Food Science* 57(1): 1992: 121-127

Tortillas prepared with different composite blends of wheat, cowpea and peanut flours were evaluated by mixture response surface methodology. Results showed that substitution of wheat flour with upto 24% cowpea and 46% defatted peanut flours resulted tortillas with quality characteristics similar to those from 100% wheat. Sensory evaluation indicated that beany flavour was the most limiting attribute. Sensory attributes correlated significantly with physical and compositional measures of tortillas and physical measures of tortilla dough. SRA

MILK AND DAIRY PRODUCTS

Milk

2492

Woychik (JH), Cooke (P) and Lu (D). **Microporous ultrafiltration of skim milk.** *Journal of Food Science* 57(1): 1992: 46-48, 58

Membranes with porosities of 100 and 200 nm, were used to obtain a 4:1 milk volume reduction. Average micelle diam. determined from electron micrographs were 46 nm (permeate) and 52 nm (permeate) for the 100-nm-pore fractions and 46 and 55 nm for the 200-nm-pore fractions. The calculated average micellar volumes of the retentate fractions were about twice those of the corresponding permeate fractions. Casein-whey ratios were 0.7 - 0.9 in the permeates and 5.0 - 7.7 in the retentates. Higher α_{s2} - and lower β -casein contents were found in the permeate micelles than in the retentates. AS

2493

Xu (SY), Stanley (DW), Goff (HD), Davidson (VJ) and Le Maguer (M). **Hydrocolloid/milk gel formation and properties.** *Journal of Food Science* 57(1): 1992: 96-102

Three rheological measurements, as well as cryo-scanning electron microscopy, were used to study the mechanism of gel formation and structure of a hydrocolloid-based milk gel. Processing conditions included combinations of pH level and total solids concn. as well as fat content. The first two variables and their interaction influenced gel point, gel strength, viscoelasticity and syneresis; while fat served primarily as a filler of the gel matrix, it also influenced those properties. In model studies of carrageenan and kappa-casein, calcium ions promoted gelation. Gel microstructure was dictated by processing variables and governed physical properties. The cold-setting mechanism occurred in three stages, hypothesized to include increased viscosity and mol. alignment, mol. interaction, and aggregation. AS

2494

Mishra (AK) and Kuila (RK). **Growth response of *Bifidobacterium* in semi + synthetic and milk based media.** *Indian Journal of Dairy Science* 44(3): 1991: 226-231

Optimal growth of 7 strains of *Bifidobacterium bifidum* were studied in various media (Yoshioka medium, Tomarelli medium, fortified Tomarelli medium, modified MRS broth, A2 medium, cow milk and buffalo milk with 2% modified MRS broth, cow and buffalo milk with 2% pepsin digested milk and Kesikowa medium). All the media tried were equally good for growth of *B. bifidum*. Cow milk with 20% pepsin digested milk was the best suited for their growth as it gave the highest mean values of 7.51 log counts/ml. optimum growth *B. bifidum* was obtained at pH 7.2 in a liquid medium heated for 15 min prior to inoculation, at an incubation temp. of 37 C in 48 h. SRA

2495

Lin (T-C), Chen (I-J) and Ko (Y-C). **The mechanism of determining the adulteration of whole milk with milk powder by spectrophotometry.** *Die Nahrung* 35(4): 1991: 351-358

The spectrophotometric method for detn. of the reconstituted milk adulteration in the raw milk has been suggested by empirical exp. However, the mechanism is unclear. In this study it was found that the mechanism is the turbidity difference between homogenized milk and non-homogenized milk. The equation of turbidance $S = KBC(d^3/d^4 +$

λ^4) is offered as an explanation of this observation. There are linear relationships between transmittance ($T[\%]$) and the amount of there constituted milk added ($r = 0.99$) to the raw milk, non-homogenized milk, and homogenized milk. This method is recommended for detecting the addition of reconstituted milk to raw or non-homogenized milk. The result of the empirical methods showed that the detection rate of adulteration can be as accurate as 2.5%, but this method is not recommended for detecting the adulteration of homogenized milk. AS

2496

Parris (N), Purcell (JM) and Ptashkin (SM). **Thermal denaturation of whey proteins in skim milk.** *Journal of Agricultural and Food Chemistry* 39(12): 1991: 2167-2170

Heat-induced denaturation of whey proteins, analyzed by reversed-phase HPLC, indicated that denaturation proceeds in two stages. The first stage of denaturation proceeds less rapidly than the second stage. Aggregation of whey proteins begins at about 70 C, more aggregation was found to occur in sweet whey than in acid whey. The dimer of β -LG and the β -LG- α -LA complex were found to form preferentially in heated acid whey. Comparison of the second derivative Fourier transform infrared spectra of reconstituted skim milk and high-heat non-fat dry milk (NDM) powder (85 C) showed that heat treatment results in formation of two new bands (1684 and 1613 cm^{-1}) in the amide I region at frequencies usually associated with intermolecularly hydrogen bonded β sheets. The bands were smaller in sweet whey, compared with acid whey; difference spectra indicated that β -LG was primarily responsible for the formation of heat-induced hydrogen bonding. AS

Milk powders

2497

Om Prakash, Goyal (GK) and Joginder Singh. **Physico-chemical properties of spray- and roller-dried whole milk powders made from goat milk.** *Indian Journal of Animal Science* 60(3): 1990: 369-372

The physico-chemical properties of goat whole milk powder samples obtained by spray-and roller-drying processes were compared. The bulk density, loose as well as packed, and wettability were higher for spray-dried samples, while solubility index, dispersibility and sinkability were more in roller-dried samples. The fat content, total solids content and pH value were greater for the spray-dried powder. The moisture content, titratable acidity and total reducing capacity were

higher in roller-dried powder. The method of drying significantly influenced the each studied physico-chemical property of the goat whole milk powder samples. AS

Milk products

2498

Chiralt (A), Ferragut (V) and Salazar (JA). **Rheological characterization of low-calorie milk-based salad dressings.** *Journal of Food Science* 57(1): 1992: 200-202

Oil-in-water emulsions of different quantitative composition, containing milk powder and locust bean gum as stabilizing agents, showed similar rheological behaviour: time-dependent thixotropic character and yield stress. Thixograms obtained for each sample could be modelled through the Hahn equation for the different shear rates. The analysis of the Hahn parameter variation for each sample as a function of shear rate led to a function $\sigma = f(\gamma, t)$. Predicted shear stress values had relative errors lower than 10% in 99.9% of the samples studied. Analysis of composition influence on the rheological parameters showed and interactive role of gum, milk and acetic acid concn. on emulsion consistency. AS

2499

Tewari (BD) and Sunil Sachdeva. **Development of a manufacturing technique for paneer/chhana spread.** *Indian Journal of Dairy Science* 44(3): 1991: 232-235

An acceptable bland flavoured spread based on paneer/chhana prepared from cow or buffalo milk could be standardised to contain fat: solid-not-fat ratio of 1:3. Lower temp. of coagulation resulted in a softer chhana and consequently better body and texture of the spread. The product packed in polystyrene cups has a shelf-life of about 7-10 days at 8 C. SRA.

Burfi

2500

Sharma (GK), Madhura (CV) and Arya (SS). **Studies on preparation, packaging and storage of besan (Bengalgram flour) burfi.** *Journal of Food Science and Technology (India)* 29(5): 1992: 289-292

Preparation of besan burfis (BB) and their storage behaviour in various packaging materials has been reported. BB remained acceptable for 9 and 6 months at room temp. and 37 C respectively in polyethylene and polypropylene pouches. In paper-Al foil-polyethylene pouches, the BB remained acceptable for 13 and 9 months at room

temp. and 37 C, respectively. Packaging in BHA and BHT treated polyethylene film considerably reduced the rate of peroxidation during storage due to migration of antioxidants from film to BB. Comparatively, BHT migrated faster than BHA and the rate of peroxidation was slower in samples packed in BHT treated film. The rate of storage deterioration was lowest at 0.33 aw and both below and above this level, the rate increased considerably. AS

Butter

2501

Lee (S-R), Macku (C) and Shibamoto (T). **Isolation and identification of headspace volatiles formed in heated butter.** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 1972-1975

Unsalted sweet butter was heated at 100, 150 or 200 C for 5 h. The headspace volatiles formed were collected during heating using a simultaneous purging and solvent extraction apparatus. Among 140 peaks on a gas chromatogram of the headspace sample from butter heated at 200 C, 77 were positively identified by GC and GC/MS. Major compounds identified were 21 aldehydes, 12 fatty acids, 11 ketones, 10 nitrogen- and/or S containing compounds, 7 alkanes, 6 δ-lactones, and 4 furans, which constituted over 85% of total volatiles recovered. The number of volatiles formed in a headspace of butter heated at 100 or 150 C was much less than that formed at 200 C. However, all volatiles formed at 100 and 150 C were found in a sample heated at 200 C. AS

Cheese

2502

Luna (JA) and Chavez (MS). **Mathematical model for water diffusion during brining of hard and semi-hard cheese.** *Journal of Food Science* 57(1): 1992: 55-58

The integral method, which is an approximate analytic method, was used to obtain the theoretical profile of moisture changes during brining of cheese. A mass layer was defined in the model where all water variations take place. The model was applied at different times to semi-hard cheese brining and compared with experimental data. A moisture pseudo diffusion coeff. was obtained from experimental data as part of the proposed model. Agreement was good, which demonstrated the applicability of the model. AS

2503

Stampanoni (CR) and Noble (AC). **The influence of fat, acid and salt on the perception of selected taste and texture attributes of cheese analogs: A scalar study.** *Journal of Texture Studies* 22(4): 1991: 367-380

Twelve cheese samples with varying fat levels (10, 17.5 and 25%) NaCl (0.5 and 2%) and citric acid (0.1 and 1.2%) were evaluated by a trained panel for sourness, saltiness, springiness, firmness, cohesiveness and adhesiveness on a graphic scale and by Instron for rheological measurement. Results indicated that the increased salt content in cheese analogs increased the saltiness, sourness and decreased pH; increasing the acid or salt content decreased cohesiveness, springiness and an increase in firmness and higher fat content gave softer, less springy, more cohesive and adhesive cheese analog. SD

2504

Stampanoni (CR) and Noble (AC). **The influence of fat, acid and salt on the temporal perception of firmness, saltiness and sourness of cheese analogs.** *Journal of Texture Studies* 22(4): 1991: 381-392

A trained panel evaluated computerized time-intensity (T-I) parameters, saltiness, sourness and firmness of 8 cheese samples of varying fat (10 and 25%), NaCl (0.5 and 2%) and citric acid (0.1 and 1.2%). Instron compression and pH data were also collected. Max. intensity of saltiness and sourness were perceived when the samples were dissolved and continued to be perceived upto 65 and 50s following the breakdown of the cheese analog structure. Acid increased sourness, salt increased saltiness and sourness. Acid or salt increased firmness and decreased fat. SD

2505

Goyal (GK) and Babu (KE). **Influence of packaging and storage on the chemical quality of processed cheese.** *Indian Journal of Dairy Science* 44(4): 1991: 247-279

The processed cheese samples packaged in tin cans and stored at 30 C and 60% RH and 7.8 C and 80% RH for different time intervals showed the least chemical changes during storage under both the conditions. Samples packed in LDPE cups and polystyrene cups showed significant changes in chemical quality. BV

Chhana

2506

Goyal (GK). **Influence of packaging on the chemical quality of chhana during storage under refrigeration conditions.** *Indian Journal of Dairy Science* 44(3): 1991; 236-246

Chhana samples packaged in poster paper/Al foil/LDPE ($55/60 \text{ g/m}^2$, 0.02 mm and 150 guage)-P₁ showed min. chemical deterioration during storage followed by the samples packed in poster paper Al foil/LDPE ($50/60 \text{ g/m}^2$, 0.009 mm and 150 guage)-P₂ and MST cellulose film/LDPE (30 g/m^2 and 150 guage)-P₃ respectively in descending order. The package P₁ was referred for packaging and storage of chhana at 4-5°C and 100% RH. BV

Ice cream

2507

Arora (KL) and Bhatia (KL). **Formol titration method for determining protein content in ice cream.** *Indian Journal of Animal Science* 60(10): 1990; 1252-1255

Khoa

2508

Patel (AA), Patil (GR), Garg (FC), Gupta (SK) and Rajorhia (GS). **Effect of concentration conditions on texture of Khoa.** *Journal of Food Science and Technology (India)* 29(5): 1992; 323-324

The steam kettle process A of khoa-making yielded a product that was significantly harder, springy, gummy and chewy, but less adhesive than that from the simulated traditional process B. Sensory evaluation also showed that firmness and chewiness were higher for process A. Having higher smoothness and lower crumbliness, khoa made by process B was rated appreciably more desirable from the view-point of overall textural quality. High-moisture khoa (Dhap) was softer and smoother, but less gummy and less chewy as compared to low-moisture khoa (Pindli). The interactions of process with moisture and milk acidity were statistically non-significant for all texture parameters except sensory chewiness. AS

Wheys

2509

Ker (YC) and Toledo (RT). **Influence of shear treatments on consistency and gelling properties of whey protein isolate suspensions.** *Journal of Food Science* 57(1): 1992; 82-85, 90

Suspensions of whey protein isolate (WPI) subjected to controlled shearing by capillary extrusion, and rheologically tested after shearing, showed increasing consistency index as applied shear rate increased. Sheared suspensions gelled more rapidly than unsheared ones and produced stronger gels. SEM micrographs showed the development of a fine fibrous-like structure in the sheared suspensions, indicating numerous sites of protein-protein interaction. Sheared WPI suspensions, added as a replacement for fat in frankfurter formulations, showed excellent water-holding capacity, producing low-fat frankfurters with elastic moduli in the same order of magnitude as commercial frankfurters. AS

2510

Krishnaiah (N), Reddy (CR) and Rama Rao (M). **Development of beverage from acid whey.** *Indian Journal of Dairy Science* 44(4): 1991; 300-301

Three categories of whey beverages: (i) prepared by the addition of sugar (10%) and citric acid (0.2%) to deproteinated whey: orange essence and orange colour; (ii) prepared by mixing 3 parts of acid whey with pH 6.8, one part of toned milk and sugar at 10% level and pineapple essence and yellow colour; and (iii) prepared by mixing 3 parts of acid whey with pH 6.8, one part of toned milk and sugar at 10% level and banana essence and lemon yellow colour were formulated. All the categories of whey beverages were acceptable with almost identical sensory quality. (ii) and (iii) categories of beverages were more acceptable than the (i) due to added toned milk. BV

Milk proteins

Caseins

2511

Haque (ZU) and Khalifa (MY). **k-Casein heterogeneity and mild heating effects on susceptibility to chymosin action.** *Journal of Food Science* 57(1): 1992; 49-54

Bovine SH-k-casein (k-C-pool) was fractionated into 5 components based on carbohydrate and sialic acid contents ($k\text{-C-P}_1 < k\text{-C-P}_2 < k\text{-C-P}_3 < k\text{-C-P}_4 < k\text{-C-P}_5$) by ion-exchange chromatography (DEAE-cellulose). Chymosin susceptibility observed by monitoring changes in optical density during enzyme action, varied among the components. This was a reflection of the difference in self-association of the proteins in aqueous dispersion as determined by hydrophobic interaction chromatograph. There was an inverse relationship between surface hydrophobicity of the protein polymers ($k\text{-C-P}_2 > k\text{-C-P}_3 > k\text{-C-P}_4 > k\text{-C-P}_5$)

$k\text{-CpP}_1 > k\text{-C-pool}$) and their susceptibility to chymosin at 37°C, pH 6.8 ($k\text{-C-pool} > k\text{-C-P}_1 > k\text{-C-P}_4 > k\text{-C-P}_3 > k\text{-C-P}_2$). Mild heating decreased susceptibility and affected flocculation of all except the highly glycosilated components $k\text{-C-P}_4$ and $k\text{-C-P}_5$ reflecting amphipathicity imparted thermostability. AS

MEAT AND POULTRY

Meat

2512

Shahidi (F) and Pegg (RB). **Nitrite-free meat curing systems: Update and review.** *Food Chemistry* 43(3): 1992: 185-191

The systems consisted of pre-formed cooked cured-meat pigment, antioxidant and/or sequesterant and antimicrobial agent and applied to comminuted and solid cuts of muscle foods. Colour, oxidative stability and flavour of the treated samples were similar to those of their nitrite-cured counterparts. SD

2513

Lind (I) and Rask (C). **Sorption isotherms of mixed minced meat, dough, and bread crust.** *Journal of Food Engineering* 14(4): 1991: 303-315

The desorption isotherms of frozen and thawed mixed minced meat were determined at 6 and 20°C, and frozen and thawed white bread dough at 6 and 30°C. The sorption behaviour of bread crust was determined during adsorption at 30 and 90°C. The aw was measured on thawed mixed minced meat, minced meat, and white bread dough. The Oswin model, $X = a / aw / (1 - aw)^n$, was fitted to the experimental desorption isotherms of mixed minced meat and dough. The values of the constants a and n were found to be $Ina = -0.0026T + 3.297$ and $n = 0.565$ for the mixed minced meat, and $Ina = -0.0071T + 4.50$ and $n = 0.380$ for the dough. AS

2514

Marin (ML), Casas (C) and Sanz (B). **Estimation of the hydrophobicity modifications in meat proteins upon thermal treatment.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 187-193

A fluorescent probe method using 8-anilino-1-naphthalene sulfonic acid (ANS) and all-trans-retinol (RET) has been used to study the effects of heat treatments on the hydrophobicity of meat proteins. The number of ANS binding sites per unit protein increased from 0.75 for unheated samples to 2.12 for meat proteins heated at 100°C

for 30 min. The number of RET binding sites increased from 0.13 to 0.46 with the same heat treatment. This is discussed in terms of % increase in aromatic (182.7%) and aliphatic (253.8%) hydrophobicity for meat proteins heated at 100°C for 30 min. On the other hand, the assay was able to discriminate between samples of meat proteins receiving heat treatments with 10°C intervals (between 40 and 100°C). AS

Beef

2515

Spanier (AM), Vercellotti (JR) and James (CJr). **Correlation of sensory, instrumental and chemical attributes of beef as influenced by meat structure and oxygen exclusion.** *Journal of Food Science* 57(1): 1992: 10-15

2516

Troutt (ES), Hunt (MC), Johnson (DE), Claus (JR), Kastner (CL), Kropf (DH). **Characteristics of low-fat ground beef containing texture-modifying ingredients.** *Journal of Food Science* 57(1): 1992: 19-24

Dietary fibers, starches and polydextrose were incorporated unhydrated into 5 and 10% fat hamburger for texture modification and comparison to 5, 10, 20 and 30% fat controls. Levels for individual and total ingredients ranged from 0.5 to 4% and 3.5 to 6%, respectively. Treatments containing polydextrose, starch and fiber had cooking losses 20-40% less than controls. Patties containing three-way combinations of ingredients were more similar to 20% fat controls for texture traits than were those containing 1 or 2 ingredients. Patties with ingredients had less oily coating of the mouth, but less juicy than controls. Beef flavour intensity scores were reduced slightly for low-fat patties with ingredients. Texture modification of low-fat ground beef is possible with food-grade ingredients. AS

2517

Troutt (ES), Flunt (MC), Johnson (DE), Claus (JR), Kastner (CL), Kropf (DH), Stroda (S). **Chemical, physical, and sensory characterization of ground beef containing 5 to 30 percent fat.** *Journal of Food Science* 57(1): 1992: 25-29

Ground beef patties containing 5, 10, 15, 20, 25 and 30% fat were evaluated raw and after cooking to either 71 or 77°C. Cooking losses were lowest for 5-20% fat patties (24.7-26.0%), intermediate for 25% fat patties (28.9%), and highest for 30% fat patties (32.1%). Low-fat patties (5 and 10%) were firmer in texture, more crumbly at end-of-chewing, less juicy and flavourful, and caused less oily coating

of the mouth than 20-30% fat patties. Warner-Bratzler and Lee-Kramer shear forces decreased as fat increased. Instron texture profile analysis also indicated greater peak forces, springiness, and cohesiveness for low-fat patties. Cooking to 77 vs 71 C accentuated differences in palatability between low- and high-fat patties. AS

2518

Pommier (SA). **Vitamin A, electrical stimulation, and chilling rate effects on lysosomal enzyme activity in aging bovine muscle.** *Journal of Food Science* 57(1): 1992; 30-35

2519

Lasta (J), Blackwell (JH), Sadir (A), Gallinger (M), Marcoveccio (F), Zamorano (M), Ludden (B), Rodriguez (R). **Combined treatments of heat, irradiation, and pH effects on infectivity of foot-and mouth disease virus in bovine tissues.** *Journal of Food Science* 57(1): 1992; 36-39

Beef steaks

2520

Harris (JJ), Miller (RK), Savell (JW), Cross (HR) and Ringer (LJ). **Evaluation of the tenderness of beef top sirloin steaks.** *Journal of Food Science* 57(1): 1992; 6-9, 15

Mutton

2521

Reddy (PV), Reddy (MS), Jayavardhan (M) and Reddy (GR). **Effect of electrical stimulation on certain biochemical and quality characteristics of mutton carcass.** *Indian Journal of Animal Science* 61(8): 1991; 906-908

Electrical stimulation (ES) of mutton carcass at 110 or 330 voltages showed no effect on total, soluble and structural proteins, total volatile nitrogen. Marked improvement in the keeping quality of meat by ES, which can be attributed to accelerating the lactic acid production and thereby inhibiting the growth of spoilage organisms was noticed. BV

Sheep

2522

Reddy (KA), Reddy (MS), Jayavardhan (M) and Reddy (KS). **Effect of electrical stimulation on certain quality characteristics of sheep carcass.** *Indian Journal of Animal Science* 61(8): 1991; 912-914

Electrical stimulation (ES) of the carcass had no significant effect on the carcass internal temp.

Mean pH between the control and electrically stimulated samples showed significant difference. In electrically stimulated carcasses 6.0 pH was attained in 2 h, whereas unstimulated carcasses required 12 h to attain the same pH. Both low (110) and high (330) voltage electrical stimulations brought down the pH to 6.0 within 2 h of stimulation. A gradual increase in exudation area as storage time increased, thereby decreasing water-holding capacity in 24 h of storage. ES samples had significantly less mean shear force values than control samples. Electrical stimulation and storage time had a significant effect on tenderness and overall acceptance scores. There were no significant differences between the voltages applied on tenderness and overall acceptance scores. BV

Pork

2523

Nanu (E), Narayan (KG) and Yadava (R). **Bacteriological quality of ready-to-eat pork kabab stored under marketing conditions.** *Journal of Food Science and Technology (India)* 29(5): 1992; 309-310

Samples of pork kabab from 8 batches, incubated at 37 C, were found to be free of *Salmonella*, sulphite reducing clostridia, coliforms, faecal streptococci and *Escherichia coli* at 0 and 8 days of storage. One sample yielded coliform at 44 C incubation while 2 samples were positive for staphylococci at 37 C. Mesophilic bacteria increased significantly as against no change in the count of psychrophilic bacteria upon storage for 8 days. The aw of the product did not change to any appreciable extent. AS

Rabbit meat

2524

Aravind Reddy (M), Srinivasa Reddy (M), Ramakrishna Reddy (G) and Suresh Reddy (V). **Certain quality characteristics of rabbit meat as influenced by breed and sex.** *Indian Journal of Animal Science* 60(7): 1990; 896-899

Reindeer meat

2525

Penfield (MP), Swanson (RB), Mitchell (DS), Riemann (MJ) and Dorko (CL). **Restructured reindeer steaks: Effects of flake size, phosphate, and salt on sensory properties.** *Journal of Food Science* 57(1): 1992; 252-253, 255

Steaks, fabricated from forequarters from field-slaughtered Alaskan reindeer, were prepared from meat flaked to two sizes (1.295 and 1.095 cm), with (0.5%) and without phosphate, and with (0.5%) and without salt. Phosphate did not appreciably effect sensory properties. Larger flakes and salt improved quality and acceptability, therefore, additional steaks were fabricated from meat flaked with a larger cutting head (4.064-cm) and with 3 levels of salt (0.0, 0.5 and 0.75%). Steaks containing 0.75% salt were less chewy, softer, juicier, and more acceptable than those made with 0.5% salt but did not differ from those containing no salt. Feasibility of producing restructured steaks from reindeer forequarters was demonstrated. AS

Products

2526

Moore (TM), Skelley (GC), Oilkington (DW), Halpin (E), Acton (JC), Grimes (LW). **Composition and palatability of country cured hams comparing hot boning, cold boning and intact hams.** *Journal of Food Science* 57(1): 1992: 1-5

2527

Kotzekidou (P). **Identification of staphylococci and micrococci isolated from an intermediate moisture meat product.** *Journal of Food Science* 57(1): 1992: 249-251

The identification of staphylococci and micrococci isolated from an intermediate moisture meat product, basturma, was studied. From the 120 isolates 92.5% were classified as staphylococci and 7.5% as micrococci. The differentiation of the species revealed: 42% *Staphylococcus epidermidis*, 32% *Staph. saprophyticus*, 12% *Staph. simulans*, 4% *Staph. carnosus*, 2% *Staph. hyicus* subsp. *hyicus* and 7.5% *Micrococcus varians*. AS

Poultry

Chickens

2528

Hsia (HY), Smith (DM) and Steffe (JF). **Rheological properties and adhesion characteristics of flour-based batters for chicken nuggets as affected by three hydrocolloids.** *Journal of Food Science* 57(1): 1992: 16-18, 24

Time-dependent (TD), apparent viscosity (AV), shear-thinning behaviour, recovery and adhesion characteristics were determined on 30% solids flour-based (equal amounts of modified starch, wheat flour, and yellow corn flour) batters containing hydrocolloids (guar (GG), xanthan (XG)

and carboxymethylcellulose (CMC)) at 0.25, 0.5 and 1.0%. Most batters were thixotropic. Batters containing XG showed greatest ($P < 0.5$) μ_0 viscosity followed in decreasing order by GG, CMC and control batter. AV correlated highly positively with batter adhesion characteristics measured on chicken nuggets as coating pickup, overall yield and cooked yield. Quantifying TD makes possible prediction of changes in batter AV with mixing time and makes possible scientifically based adjustments in batter formulation to maintain constant breading pickup. SRA

2529

Pandey (NK), Anand (SK), Mahapatra (CM) and Verma (SS). **Quality changes and shelf-life of frozen chicken stored at -18 C due to repeated electricity failure.** *Indian Journal of Animal Science* 61(11): 1991: 1255-1257

Electricity failure for 9 h daily resulted in significantly more storage and drip losses than for 6 h ones after 28 days of storage indicating more loss of moisture as drip due to longer freeze-thaw cycles. Microbiological studies revealed a significant increase in the counts of total aerobes and psychrotrophs increased significantly in both 6 and 9 h groups after 28 days of storage. There was a significant decrease in taste panel scores for appearance, flavour, juiciness, texture and overall acceptance, but flavour scores suffered most after 28 and 21 days in 6 and 9 h electricity failure respectively. The results suggest that frozen chicken were acceptable for 28 days even after exposure to repeated freeze-thaw cycles due to 9 h electricity failure daily, while it was acceptable only for 21 days when subjected to 9 h electricity failure. BV

2530

Reddy (VR), Sudhakar (J) and Rao (PV). **Carcass yield of chicken as influenced by bird type, age and dietary protein and energy.** *Indian Journal of Animal Science* 60(3): 1990: 365-369

The comparative carcass yields of sexed broilers and White Leghorn (WL) cockerels fed 2 levels of protein and energy were determined at 2 marketing ages. The per cent feather loss to live wt. was low in male broilers followed by those in female broilers and WL cockerels. Early age of slaughter favoured less feather per cent in male broiler but increased in cockerel, whereas it had no effect in broiler female. Dressed yields were more in male broiler whereas the eviscerated and ready-to-cook yields were higher in broiler female. Comparatively all carcass yields except giblets were low ($P < 0.05$) in WL cockerel. Among the bird types when age of slaughter was considered the female broiler at 42 days of age

yielded more eviscerated and ready-to-cook yield, while WL cockerel at 70 days yielded heavier giblets. Though the diet alterations significantly influenced all the carcass yields of sexed broilers, it had no effect in the case of cockerels. AS

2531

Pandey (NK), Anand (SK), Mahapatra (CM) and Verma (SS). **Effect of repeated freezing and thawing on physico-chemical, microbial and sensory characteristics of frozen chicken.** *Indian Journal of Animal Science* 60(12): 1990: 1495-1501

Physico-chemical properties, shelf-life and acceptability of frozen chicken were assessed in different seasons upon repeated freezing and thawing. There was a significant increase in storage and drip losses up to 4 freeze-thaw cycles during summer and rainy seasons. In winter, storage loss increased only after 5 cycles. Water-holding capacity of breast and leg muscles improved significantly as compared to control. Higher TBA values of breast muscles during summer, and of leg muscles during summer and rainy seasons were recorded over those for control. The extractability of sarcoplasmic proteins of breast and leg muscles showed no change whereas myofibrillar proteins increased. A decreasing moisture content of breast and leg muscles was noted only during rainy season after 1 freeze-thaw cycle. However, the total protein did not change. Total aerobic plate counts increased by 2 to 3 log cycles after 4 freeze-thaw cycles. The counts of coliforms, staphylococci and psychrotrophs followed a similar trend. However, the increase in bacterial number was significantly different in different seasons. The frozen birds could successfully withstand 3 freeze-thaw cycles during summer and rainy seasons and 4 cycles during winter. This observation was also supported by sensory evaluation. AS

2532

Szczawinska (ME), Thayer (DW) and Phillips (JG). **Fate of unirradiated *Salmonella* in irradiated mechanically deboned chicken meat.** *International Journal of Food Microbiology* 14(3/4): 1991: 313-324

Mechanically deboned chicken meat was irradiated at 0, 1.25 and 2.50 kGy (Cesium 137) and inoculated with *Salmonella dublin* ATCC 15480, *S. enteritidis* ATCC 9186 or *S. typhimurium* ATCC 14028. Samples were then stored at 5°C and 10°C and were subjected to microbiological analysis directly after irradiation and inoculation (time 0), and after 24, 72, 120, 168 and 216 h of storage. Samples stored at 20°C were examined at time 0 and after 6, 12 and 24 h of storage. Irradiation at 1.25 and 2.50 kGy caused an average reduction in bacterial levels of

2.23 and 3.44 logs, respectively. *S. dublin*, *S. enteritidis* and *S. typhimurium* showed very small, insignificant changes in numbers, during storage of meat for 9 days at 5°C. The final populations of *S. dublin* and *S. typhimurium* in samples irradiated before inoculation and stored at 10°C or 20°C were greater than the equivalent populations in samples which had not been irradiated before inoculation. Reduction of indigenous microflora in mechanically deboned chicken meat by irradiation may create better conditions for the growth of salmonellae and may thus increase the risk of salmonellosis when accidental contamination and temp. abuse occur after a radiation treatment. Therefore, irradiated mechanically deboned chicken meat should be properly refrigerated and protected against contamination. AS

Hens

2533

Kulkarni (VV), Yashpal Thakur and Narang (MP). **Effect of age and live weight on the carcass components of spent hens.** *Journal of Food Science and Technology (India)* 29(5): 1992: 326-327

The dressing % decreased significantly (P less than or equal to 0.05) with increase in live wt. The carcass components such as giblets, cuts and total inedible parts were more influenced by live wt. of the spent hens than age. AS

Products

Eggs

2534

Chung (SL) and Ferrier (LK). **pH and sodium chloride effects on emulsifying properties of egg yolk phosvitin.** *Journal of Food Science* 57(1): 1992: 40-42

The emulsifying properties of phosvitin dissolved in water and 0.1, 0.5 and 1.0 M NaCl were determined from pH 3 to 10. The change in its emulsifying activity (EA) with pH was slight but significant (p < 0.05) and emulsion stability (ES) was relatively high (68 - 73%), except at pH 5 (17%) and 10 (48%). The EA of phosvitin was higher than that of bovine serum albumin (BSA) at pH 3 or 8 and ES was higher than BSA at all pH levels except at pH 5 and 10. Added NaCl decreased in the EA of phosvitin at pH 3 and 10 and decreased the ES between pH 3 and 9. Increased instability of emulsions resulted mainly in coalescence of oil droplets at NaCl greater than or equal to 0.5M. Salt increased the viscosity of phosvitin emulsion only at pH 3 but not at pH > 5.

The viscosities of BSA emulsions were higher than those of phosvitin at pH 3, 5 or 8. AS

2535

Mine (Y). **Sulfhydryl groups changes in heat-induced soluble egg white aggregates in relation to molecular size.** *Journal of Food Science* 57(1): 1992; 254-255

The sulfhydryl content of heat-induced soluble egg white aggregates (SEWA) gradually decreased in proportion to standing time at room temp., and the mol. size of the aggregates continued to increase at least 4 days. The progress of SEWA was much inhibited by N-ethylmaleimide. SEWA are polymerized through a mechanism involving sulfhydryl-disulphide interchange and sulfhydryl oxidation during standing. AS

2536

Otles (S) and Hisil (Y). **Analysis of vitamin A in eggs by high pressure liquid chromatography.** *Die Nahrung* 35(4): 1991; 391-394

The HPLC procedure described for vitamin A is specific for retinol and rapid, precise and simple to perform in comparison with the standard methodology. Recovery of vitamin A was 97.1%. BV

Egg powder

2537

Morgan (JN) and Armstrong (DJ). **Quantification of cholesterol oxidation products in egg yolk powder spray-dried with direct heating.** *Journal of Food Science* 57(1): 1992; 43-45, 107

Outlet air temp. and nitrogen oxides (NO_x) in the combustion gases were the only conditions that affected cholesterol oxidation products (COPS) levels in egg yolk powder spray-dried with direct heating. At outlet temo. of 150 C, total COPS concn. in the spray-dried product were 75 p.p.m. at 5 p.p.m. NO_x and 213 p.p.m. at 300 p.p.m. NO_x . In products dried at 75 C outlet temp. total COPS concn. were 21 p.p.m. at 5 p.p.m. NO_x and 58 p.p.m. at 300 p.p.m. NO_x . In general COPS responded to outlet temp. and NO_x in the same manner as total COPS. SRA

SEAFOODS

Fish

2538

Nambudiri (DD) and Gopakumar (K). **ATPase and lactate dehydrogenase activities in frozen stored**

fish muscle as indices of cold storage deterioration. *Journal of Food Science* 57(1): 1992; 72-76

The effect of prolonged cold storage on muscle adenosine triphosphatase (ATPase) and lactate dehydrogenase (LDH) activities was studied in a variety of fresh water and brackish water fish. Decrease in enzyme activity was observed in all samples stored frozen (-20 C) over a period of 180 days. Highly significant negative correlation was observed between enzyme activity and frozen storage period with mullet, pearlspot, milk fish and tilapia. Significant linear correlations were observed between decrease in enzyme activities and other biochemical indices and sensory scores. The results indicated that loss of activities of ATPase and LDH in fish muscle was significantly related to early changes in quality of frozen stored fish. AS

2539

Luong (JHT), Male (KB), Masson (C) and Nguyen (AL). **Hypoxanthine ratio determination in fish extract using capillary electrophoresis and immobilized enzymes.** *Journal of Food Science* 57(1): 1992; 77-81

Fish freshness was assessed using capillary electrophoresis and an immobilized enzyme procedure to monitor degradation of inosine-5'-monophosphate (IMP), inosine (HxR) and hypoxanthine (Hx). The enzymatic method used an amperometric probe at + 0.7 V (platinum vs silver/silver chloride) with immobilized xanthine oxidase, catalase, nucleoside phosphorylase, and nucleotidase for converting Hx, HxR or IMP to uric acid. Capillary electrophoresis resolved IMP, inosine and Hx by migration rates resulting from an applied electric field (416 V/cm, 50 μA). Components were detected at 250 nm. The H ratio of Hx/[IMP + HxR + Hx] and simplified K value of [HxR + Hx]/[IMP + HxR + Hx] were determined in cod, salmon and trout stored on ice (0 - 4 C) and at 20 C. The 2 procedures agreed and for all species H ratio and K values increased with storage time. AS

Bass

2540

Boyd (LC), Green (DP) and LePors (LA). **Quality changes of pond-raised hybrid striped bass during chillpack and refrigerated storage.** *Journal of Food Science* 57(1): 1992; 59-62

Pond-raised hybrid striped bass were commercially processed into fillets with and without belly flap, packaged in oxygen permeable bags (Cryovac ETM), and stored as chillpack samples (-2 C) and as refrigerated samples (2 C). Quality changes were

determined over 21 days storage by microbiological, chemical and sensory evaluations. Aerobic plate counts and hypoxanthine formation showed evidence of rapid deterioration of refrigerated samples after 8 days storage compared to 21 days for chillpack samples. A trained sensory panel found 21 day stored chillpack samples similar in flavour and aroma but of firmer texture than refrigerated samples stored 8 days. Panelists found no differences between trimmed and whole fillets. Hypoxanthine formation and aerobic plate counts appeared to be good indicators of quality deterioration, whereas thiobarbituric acid measurements were not. AS

Hoki

2541

Macdonald (GA), Lelievre (J) and Wilson (NDC). **Effect of frozen storage on the gel-forming properties of hoki (*Macruronus novaezealandiae*)**. *Journal of Food Science* 57(1): 1992; 69-71

The possibility of using frozen hoki to make surimi was investigated. At intervals, fish were thawed under controlled conditions and gels were then made from minces of the flesh. Both puncture and torsion tests showed the quality of gels declined with duration of storage of frozen hoki. This decline was matched by a decrease in pH and an increase in formaldehyde concn. in the frozen flesh. The data suggest a land-based surimi plant could not be operated outside the harvesting season to any appreciable extent using frozen hoki stored at -29 C. AS

Rohu

2542

Sinha (DK), Choudhary (SP) and Narayan (KG). **Hygienic quality of rohu fish (*Labeo rohita*) sold in Ranchi town**. *Journal of Food Science and Technology (India)* 29(5): 1992; 308-309

The gills of Rohu fish (*Labeo rohita*) had higher bacterial load and faecal contamination indicative microorganisms followed by skin and muscles. On an av., Rohu fish sold was found to be of poor hygienic quality. AS

Sardines

2543

Krzymowek (J), Uljua (DS), Panunzio (LJ) and Maney (RS). **Factors affecting fat, cholesterol, and ω -3 fatty acids in Maine sardines**. *Journal of Food Science* 57(1): 1992; 63-65, 111

Maine sardines harvested June, July, October and November were analyzed for moisture, ash, fat, cholesterol, and fatty acids either as whole fish, raw dressed, steam precooked, and after canning in soy oil, menhaden oil, or in the liquid exuded after steam precooking (cookout liquid). Fat content ranged from 5% for juvenile herring samples June and October to 11% in maturing herring harvested prior to the spawning season in July. All canning liquids contributed to elevated fat content in the finished product. Herring packed in soy oil or cookout liquid had about 90 mg cholesterol/100g samples. Herring packed in menhaden oil had 100 - 115 mg cholesterol/100g. Herring packed in either of the two fish oil solutions contained significantly more ω 3 fatty acids and had a greater ratio of ω 3: ω 6 than those packed in soy oil. AS

2544

Sanchez-Muniz (FJ), Higon (E), Cava (F) and Viejo (JM). **Acceptability of diets containing olive oil fried sardines (*Sardina pilchardus*) in the prevention of dietary hypercholesterolaemia in rats**. *Journal of the Science of Food and Agriculture* 56(2): 1991; 155-165

The acceptability of diets containing fried sardines (*S. pilchardus* Walb) was studied for 4 wks in growing Wistar rats. Group 1 was fed with a diet containing casein and olive oil as protein and fat sources respectively, and groups 2 and 3 received diets containing sardines fried in olive oil which had been used a known number of times. Group 2 was fed with a mixture of fried sardines from the first and second oil-use occasions as the only source of protein and fat, while group 3 got a mixture of fried sardines from the eighth to tenth oil-use fryings. All diets contained cholesterol plus bovine bile as a blood cholesterol-raising agent. Food intake, body wt. increase and dietary efficiency ratio (DER) were all similar in groups 1 and 2, showing that the olive oil fried sardine diet was well accepted. However, group 3 ate significantly less ($P < 0.01$) and showed smaller ($P < 0.01$) body wt. increase and DER than groups 1 and 2. The hepatosomatic index of group 3 was higher ($P < 0.05$). The hypercholesterolaemic effect of group 1 diet was markedly reduced (5- and 15-fold after 2 wks and 4 wks respectively) in groups 2 and 3. AS

White amur

2545

Wempe (JW) and Davidson (PM). **Bacteriological profile and shelf-life of white amur (*Ctenopharyngodon idella*)**. *Journal of Food Science* 57(1): 1992; 66-68, 102

The bacteriological profile of fresh, frozen and spoiled white amur fish showed the presence of *Acinetobacter*, *Citrobacter*, *Enterobacter*, *Escherichia*, *Micrococcus*, *Moraxella*, *Pseudomonas*, *Staphylococcus* and *Streptococcus*. Storage studies on white amur flesh indicated that 4 C and 200 µg/mL sodium hypochlorite dip were most effective against coliforms. Packaging in 100% CO₂ significantly reduced aerobic plate count (APC). Freezing the flesh for 8 wk at -18 C reduced viable APC, psychrotrophs and coliforms. SRA

Products

Fish

2546

Sanjeev (S) and Surendran (PK). **Evaluation of reversed passive latex agglutination test kits for the detection of staphylococcal enterotoxins A, B, C and D in fishery products.** *Journal of Food Science and Technology (India)* 29(5): 1992; 311-312

The SET-RPLA kit for the detection of staphylococcal enterotoxins A, B, C and D showed high specificity and sensitivity with a min. detectable limit of 0.30 to 0.60 ng enterotoxin/g of fishery products. The test provides a simple, inexpensive means for semi-quantitative assay within 24 h. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

2547

Datta (S) and Nakai (S). **Computer-aided optimization of wine blending.** *Journal of Food Science* 57(1): 1992; 178-182, 205

An objective method was developed to blend wines for standardizing flavour quality. Aroma volatiles of varietal and white stock wines, and the target wine were analyzed by equilibrium gas headspace chromatography. Similarity of the aroma profiles of the varietal and stock wines to the target wine was calculated from GC peak areas. The simplex optimization program carried out computational blending to determine the ratios of the varietal and white stock wines that would be required to simulate

the aroma of the target wine. For two blending experiments, the computer optimized blend could not be differentiated from target wine by a sensory taste panel. AS

2548

Querol (A), Huerta (T), Barrio (E) and Ramon (D). **Dry yeast strain for use in fermentation of Alicante wines: Selection and DNA patterns.** *Journal of Food Science* 57(1): 1992; 183-185, 216

On the basis of the data collected from a study on microbial flora of Alicante wines at different stages of vinification, *Saccharomyces cerevisiae* strain which is capable of producing high quality wine in pilot fermentation experiments with musts was selected. The strain was characterized using several DNA fingerprinting techniques. These results open the way to use the strain as a dry yeast in order to perform controlled fermentations. CSA

2549

Arvanitoyannis (I), Frontimis (P) and Embeoglou (I). **Influence of some proteins on the contents of several metals in red wines.** *Die Nahrung* 35(4): 1991; 373-378 (De)

Addition of protein leads to an increase in Zn and Ca content, whereas the contents of Fe and Cu which can cause turbidity are decreased. BV

Non-alcoholic beverages

2550

Ezeonu (FC), Egboka (BCE) and Okaka (ANC). **Nitrate and nitrite in some non-alcoholic beverages and water supplies in Onitsha, Nigeria.** *Journal of Food Science and Technology (India)* 29(5): 1992; 329-330

Nitrate and nitrite analyses of about 200 water samples from different sources in Onitsha metropolis reveal that water from wells and boreholes are the most widely contaminated with 180 - 360 p.p.m. and 2.4 - 36.0 p.p.m. nitrate and nitrite, respectively. Presence of nitrate is attributed to the nitrate reductase activity of the microbial flora. Analysis of non-alcoholic beverages revealed an ubiquitous contamination of 0.33 - 3.48 p.p.m. of nitrite. AS

Coffee

2551

Malundo (TMM), Resurreccion (AVA) and Koehler (PE). **Sensory quality and performance of**

spray-dried coffee whitener from peanuts.
Journal of Food Science 57(1): 1992; 222-226, 251

The feasibility of producing coffee whitener by spray drying peanut extracts was studied. The whiteners were spray-dried at 200 C using atomizer speeds of 15000, 25000, 35000 r.p.m. and volumetric flow rates of 0.6, 1.2, 1.8 l/h. Performance of the whiteners in coffee was evaluated vs commercial coffee creamers by a consumer panel. Objective tests for colour, solubility, and moisture were performed. The liquid whitener had lower performance and sensory scores than commercial samples ($p < 0.01$). Recommended processing conditions for spray drying liquid whitener from peanuts at 200 C include atomizer speeds in the 15000 - 29000 r.p.m. range and volumetric flow rates > 1.80 l/h. AS

2552

Gross (GA) and Wolleb (U).
2-Amino-3,4-dimethylimidazo[4,5-f]quinoline is not detectable in commercial instant and roasted coffees. *Journal of Agricultural and Food Chemistry* 39(12): 1991; 2231-2236

A sensitive method has been developed for the isolation of 2-amino-3,4-dimethylimidazo[4,5-f]quinoline (MeIQ) from instant coffee and lyophilized home-brewed coffee. Sample cleanup was performed in four steps using Amberlite XAD-2, Extrelut/copper phthalocyanine-Sephadex HP, Sephadex HP, and propanesulfonic acid silica/octadecyl silica. The purified extracts were then separated by HPLC. To validate the procedure, picogram levels of [2-¹⁴C]MeIQ were added prior to extraction to the coffee samples: 61% and 49% of the added reference standard could be recovered in chromatographic fractions from purified instant and home-brewed coffee, as measured by liquid scintillation and Ames test mutagenicity (TA98, +S-9). At 600 and 60 p.p.t. spiking levels, clear signals were observed allowing the estimation of the detection limit for MeIQ to be about 5 - 10 pg/g of coffee beans. On this basis, MeIQ was not detectable in either sample of instant or roasted coffee. AS

Fruit juices

Fruit juice concentrates

2553

Pilando (LS) and Wrolstad (RE). **Compositional profiles of fruit juice concentrates and sweeteners.** *Food Chemistry* 44(1): 1992; 19-27

Sugar, non-volatile acid, mineral, and UV spectral profiles were determined for 7 commercial fruit juice concentrates - 'hard' pear, 'soft' pear, white grape, pineapple, prune, fig and raisin - and 3 sweeteners-invert beet, invert cane and high fructose corn syrup (HFCS). Sugar and non-volatile acids were quantitated by HPLC. Sugar analyses included glucose, fructose, sucrose and sorbitol content and non-volatile acid detn. included quinic, malic, citric, tartaric, shikimic, and fumaric acids. L-Malic content was also determined by enzymic procedures. Mineral composition was measured by induction coupled plasma spectroscopy. Fruit juice concentrates and sweeteners have characteristic compositional profiles that are useful for evaluating juice quality and authenticity. AS

FATS AND OILS

2554

Blumenthal (MM) and Stier (RF). **Optimization of deep-fat frying operations.** *Trends in Food Science and Technology* 2(6): 1991; 144-148

The paper discusses the means by which frying can be optimized in the simplest fryer: the batch operation that is used in all restaurant and fast food operations and industries. 24 references. GS

2555

Perez-Camino (MC), Marquez-Ruiz (G), Ruiz Mendez (MV) and Dobarganes (MC). **Quantitation of oxidized triglycerides for the evaluation of the total oxidation level in edible fats and oils.** *Grasas y Aceites* 41(4-5): 1990; 366-370 (Fr)

In this paper, quantitation of oxidized triglycerides is proposed as an objective measurement of total oxidation level in edible fats and oils. Detn. has been carried out using a combination of adsorption and size exclusion chromatographies. The reproducibility of the detn. is given. After oxidation, it is demonstrated that oxidized triglycerides are the only compounds increasing significantly in the samples. This group of compounds comprises primary and secondary oxidation products. AS

Fats

Sal fat

2556

Bhattacharyya (S) and Bhattacharyya (DK). **Enzymatic acidolysis of sal fat and its fractions.** *Oleagineux* 46(12): 1991; 509-513

Sal fat and its suitable fractions can be modified in respect of their fatty acid composition and thermal properties of enzymatic acidolysis reaction with 1,3-specific *Mucor miehei* lipase. The stearin fractions from acidolysed sal fat and sal olein display fatty acid compositions comparable to those of coco butter. The products also exhibit satisfactory thermal properties which indicate that the combination of enzymatic acidolysis with 1,3-specific microbial lipase like *Mucor miehei* and fractionation of acidolysed sal fat or its fraction sal olein can help in obtaining satisfactory coco butter like fats. AS

Oils

2557

Sridhar (R), Lakshminarayana (G) and Kaimal (TNB). **Modification of selected edible vegetable oils to high oleic oils by lipase-catalyzed ester interchange.** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 2069-2071

High amounts of polyunsaturated fatty acids (PUFA) present in edible oils such as peanut, sunflower, safflower, soybean, and linseed oils are susceptible to oxidative deterioration and consequently could contribute to carcinogenesis and atherogenesis. Long-chain (C₂₀₋₂₄) saturated fatty acids (LSFA) present in the sn-3 position of peanut oil play a role in atherogenesis. Monounsaturated fatty acid, oleic acid, does not exhibit these adverse effects. Hence, the replacement of LSFA and PUFA in peanut oil and of PUFA in sunflower, safflower, soybean and linseed oils with oleic acid was investigated by a batch-stirred interesterification reaction of the oil in hexane with methyl oleate using 1,3-specific lipase (*Mucor miehei*) for 4 h. The triacylglycerols (TAG) of interesterified peanut, sunflower, safflower, soybean, and linseed oils were enriched with oleic acid from 48, 42, 13, 24 and 23% to 66, 63, 47, 54 and 56%, respectively. The TAG of peanut oil were depleted of LSFA from 6.6 to 2.0%. AS

2558

Broadbent (JH). **Low-cost methods of vegetable oil extraction for rural areas.** *Oleagineux* 46(10): 1991: 385-388

Historical and traditional methods of small-scale oilseed processing are outlined, and the raw materials generally available for village level extraction are indicated. Details of the pre-treatment of the oilseeds before extraction and consideration which have to be taken into account before establishing a small-scale oilseed extraction unit, such as an adequate supply of raw material, the local demand for vegetable oil are whether there will be social and economic benefits for the rural

community are discussed. Available equipment for the small-scale extraction of oilseeds, such as animal and mechanically powdered ghanis, manually and hydraulically operated presses and expellers, are reviewed, together with an equipment package consisting of a power source, decorticator, expeller, filter press and filter pump suitable for establishing a small mill. Details of a recent economic feasibility study of small-scale oilseed processing in Brazil carried out to assess whether it would be technically and economically viable, are described and the favourable result is reported. 6 references. AS

Cottonseed oils

2559

Hawash (S), Zaher (F) and El-Diwani (G). **Economic evaluation of miscella refining of cottonseed oil.** *Grasas y Aceites* 41(4-5): 1990: 357-360

The economic feasibility of cottonseed oil refining in miscella as compared to conventional refining technique followed in local oil plants was investigated. The study was based on the refining results on the semi-pilot scale reported by the authors in a previous article. Total costs and net income due to crude oil refining and bleaching were estimated on the basis of the actual processing rate in a local oil unit Tanta (200 tons crude oil daily). In general, the technique of miscella refining was found to be more profitable than the conventional refining technique. An extra profit equivalent to 8.87 million Egyptain pounds per year could be achieved by refining 80% miscella using 75% of the recommended quantity of alkali, rather than by conventional refining technique. AS

Soybean oils

2560

Bhagya (S) and Srinivas (H). **Extraction of soybean (*Glycine max.*) with hexane - acetic acid: Effect on oil quality.** *Food Chemistry* 44(2): 1992: 123-125

Soybean flakes were extracted in a Soxhlet extractor with hexane and hexane containing different concn. of acetic acid for different periods. A concn. of 3% acetic acid in hexane and extraction for 3 h were found to be optimum for max. extraction of total lipids and phospholipids. Compared to hexane, acidic hexane extracted 5.8% and 191.3% more total lipids and phospholipids respectively. Quality characteristics of acidic hexane-extracted oil showed that the Lovibond colour intensity and free fatty acid (FFA) content were higher compared to hexane-extracted oil. However, the fatty acid composition did not show any changes. AS

SPICES AND CONDIMENTS

Cardamom

2561

Gopalakrishnan (N) and Narayanan (CS). **Supercritical carbon dioxide extraction of cardamom.** *Journal of Agricultural and Food Chemistry* 39(11): 1991; 1976-1978

Cardamom (*Elettaria cardamomum* Maton) seeds were extracted with supercritical carbon dioxide at different conditions of pressure, temp., contact time, and moisture content to estimate the yield and compositional variations. The yield of cardamom extract was found to be fairly constant at different conditions of extraction, but the non-volatiles and chlorophyll contents varied in the extract with extraction parameters. The proportion of the minor and major components also showed variations under different conditions of extraction. AS

2562

Kubo (I), Himejima (M) and Muroi (H). **Antimicrobial activity of flavour components of cardamom *Elattaria cardamomum* (Zingiberaceae) seed.** *Journal of Agricultural and Food Chemistry* 39(11): 1991; 1984-1986

The antimicrobial activity of the 10 most abundant volatile components of the cardamom (Maton) seeds has been tested against 14 microorganisms. All of the compounds tested exhibited activity against at least one or more microorganisms. BV

Tamarind kernel powder

2563

Vinay Jambhulkar and Shankhapal (KV). **Effect of minerals on lipid production by *Rhizopus nigricans* and *Penicillium nigricans* on tamarind kernel powder.** *Journal of Food Science and Technology (India)* 29(5): 1992; 333-335

The role of various metal ions at different concn. on lipid production by *R. nigricans* and *P. nigricans* in tamarind kernel medium indicated positive role of Mg, K, ferric and Zn ions, in contrast to negative effect of Ca ion. Cu and Mn affected lipid production by *R. nigricans* and *P. nigricans*, respectively. AS

SENSORY EVALUATION

2564

Elejalde (CC) and Kokini (JL). **Identification of key textural attributes of viscoelastic syrups by regression analysis.** *Journal of Food Science* 57(1): 1992: 167-171

Regression analysis was used to identify key textural attributes in the sensory evaluation of table syrups with varying viscoelastic properties. The syrups were sensorily evaluated in the mouth, while being poured out of bottle and while the syrup was spreading on a flat surface. The triplet "Viscous", "Smooth", and "Slippery" gave the best average coeff. of detn. (R^2) in the mouth; the triplet "Watery", "Even", and "Drippy" gave the best R^2 for pouring; and the triplet "Viscous", "Even", and "Smooth" the best R^2 for spreading. The results suggested that there were significantly different texture perception cues in the three different evaluation procedures. AS

2565

Barrett (AM), Normand (MD), Peleg (M) and Ross (E). **Characterization of the jagged stress-strain relationships of puffed extrudates using the fast fourier transform and fractal analysis.** *Journal of Food Science* 57(1): 1992: 227-232, 235

The jaggedness of the stress-strain relationship of two kinds of puffed extrudates stored under different humidity conditions was assessed by the power spectrum of the Fast Fourier Transform and the natural Fractal dimension of normalized compression curves. Both analyses, performed with a micro-computer, provided a consistent measure of jaggedness. The apparent Fractal dimension, obtained using the Blanket algorithm, was the most convenient measure of overall ruggedness since it was expressed by a single number. The power spectrum that resulted from the Fourier transform, however, could be used to identify the length scale of structural features where fracture takes place, and its shape could be more directly related to structural features and textural properties. AS

2566

Portmann (MO), Serghat (S) and Mathlouthi (M). **Study of some factors affecting intensity/time characteristics of sweetness.** *Food Chemistry* 44(2): 1992; 83-92

The effect of temp. on sweetness intensity of D-glucose, D-fructose and sucrose in water between 2.3 and 9.2% (w/v) was not significant due to solvent interactions and structure-maker effect of sugars in water. The slight decrease in sweetness of fructose as temp. is raised probably comes from multirotation rate which increases and provokes the transformation of the most sweet isomer (β -pyranose) into a less sweet one (β -furanose).

Persistence of sweet taste does not change significantly when temp. is increased. Increase of viscosity depresses intensity and persistence probably due to a masking of receptor site by viscosity enhancer maltodextrins. The viscometric and volumetric parameters on the one hand and by decomposition of Raman spectra in the region of OHs on the other reveal the effects of sugars and temp. on water structure whose perturbation may be deduced. SD

2567

Padmanabhan (M) and Bhattacharya (M). **Rheological measurement of fluid elasticity during extrusion cooking.** *Trends in Food Science and Technology* 2(6): 1991: 149-151

This review discusses the exit-pressure and hole-pressure methods for the on-line measurement of fluid elasticity, and the application of these methods to the control of the extrusion cooking process of fluid food. The potential application of the methods to the rheological characterization of viscoelastic fluid foodstuffs in general is also discussed. 21 references. GS

2568

Chiralt (A), Galotto (MJ) and Fito (P). **Changes in rheological properties and particle-size distribution during the manufacture of 'Xixona Turron'.** *Journal of Food Engineering* 14(2): 1991: 117-128

The so-called 'boixet' step is assumed to be the most important one in the process for manufacturing 'Xixona turron'. In this work the physical changes occurring during this step have been studied. An attempt has been made to explain the role of major turron components in this change by using rheological measurements and particle-size analysis techniques. Thixotropic behaviour has been characterized by the Hahn model. A model that describes the structural changes in the product has been proposed. AS

2569

Lundahl (DS) and McDaniel (MR). **Influence of panel inconsistency on the outcome of sensory evaluations from descriptive panels.** *Journal of Sensory Studies* 6(3): 1991: 145-157

Magnitude interaction and non-perceivers or non-discriminators, when small panel of 5 - 15 are used, had no significant effect on the test result. Cross-over discrimination increases type II error when panelists are considered as random effects while false discrimination on the type I error when panelists are considered as fixed effects. The

methods to reduce these errors on test result is discussed. SD

2570

Naes (T) and Solheim (R). **Detection and interpretation of variation within and between assessors in sensory profiling.** *Journal of Sensory Studies* 6(3): 1991: 159-177

The theoretical background on detection of variation within and among panelists is explained. The method is illustrated from the data on sensory evaluation of 4 sausages showing clearly the reproducibility of individual assessors and different types of differences among them. SD

2571

Fletcher (L), Heymann (H) and Ellersieck (M). **Effects of visual masking techniques on the intensity rating of sweetness of gelatins and lemonades.** *Journal of Sensory Studies* 6(3): 1991: 179-191

Raspberry gelatins with 9, 10, 14 and 16% sucrose and lemonades with 8, 10, 12 and 14% sucrose were rated for sweetness under visual masking conditions (red lights, red glasses, dyes and blindfolds) and a white light and clear glasses control condition. Visual masking did not significantly affect the sweetness rating. SD

FOOD STORAGE

2572

Mannapperuma (JD), Paul Singh (R) and Montero (ME). **Simultaneous gas diffusion and chemical reaction in food stored in modified atmospheres.** *Journal of Food Engineering* 14(3): 1991: 167-183

A mathematical model based on simultaneous gas diffusion and chemical reaction was developed to represent the gas exchange in foods stored in modified atm. The respiration process was modeled as a first order chemical reaction and the gas transfer process was modelled as ordinary diffusion. The resistance of the skin to gas transfer was modeled as a convective type boundary condition. A steady state solution of the model was obtained. Respiration rate, av. internal gas concn., and gas concn. under the skin were measured using 'Golden Delicious' apples. The experimental methods were analyzed based on the model to determine the properties of apples. The experimentally determined values of the properties were diffusivity of the flesh to O₂ 2.67×10^{-9} m²/s and to CO₂ 3.28×10^{-9} m²/s, conductance of the skin to O₂ 290×10^{-9} m/s and to CO₂ 220×10^{-9} m/s, and first-order reaction rate constant 7.71×10^{-6} s⁻¹. These

parameters were used in the model to simulate the internal gas concn. profiles. AS

INFESTATION CONTROL AND PESTICIDES

2573

Povey (SR) and Sibly (RM). **No oviposition plasticity in *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae).** *Journal of Stored Products Research* 28(1): 1992; 11-14

No evidence for oviposition plasticity (a phenomenon whereby some insects reduce egg laying in poor conditions and increase it when conditions improve) was found in *S. oryzae* after either 2 or 4 wks exposure to poor oviposition conditions (stale wheat grain or flour). BV

2574

Arthur (FH) and Zettler (JL). **Malathion resistance in *Tribolium confusum* Duv. (Coleoptera: Tenebrionidae): Correlating results from topical applications with residual mortality on treated surfaces.** *Journal of Stored Products Research* 28(1): 1992; 55-58

Nine *T. confusum* Duv. field strains were exposed on galvanized steel and plywood panels treated with malathion at 1.63 g a.i. per 0.28 m². Resistance frequencies for these strains were measured by topical application of a discriminating dose of 300 p.p.m. per 0.5 µl per insect. Residues on galvanized steel controlled a susceptible laboratory strain for 5 wks and 3 susceptible field strains for 3 wks. Six resistant field strains were controlled for approx. 1 wk. Known resistance frequencies were correlated to residual mortality on galvanized steel for 1-6 wks. Residues on plywood were nearly 100% effective against all field strains and the susceptible laboratory strain for 12 wks. AS

2575

Saxena (BP), Sharma (PR), Thappa (RK) and Tikku (K). **Temperature induced sterilization for control of three stored grain beetles.** *Journal of Stored Products Research* 28(1): 1992; 67-70

Stored grain beetles (*Trogoderma granarium*, *Tribolium castaneum* and *Callosobruchus chinensis*) pupae of 1, 2 and 3 days old were exposed to 30, 40 and 45 C for 24, 48 and 72 h respectively for each group. Emergence of *Tri. castaneum* and *C.*

chinensis adults were totally prevented by 48 and 72 h exposures to 45 C. In *Tro. granarium*, the inhibitory effect was greater with male pupae and the resultant adults were completely sterile. BV

BIOCHEMISTRY AND NUTRITION

2576

Huang (AS) and Byerly (DS). **Sorption isotherms and light stabilities of aluminum laked riboflavin 5'-phosphate.** *Journal of Food Science* 57(1): 1992; 245-248

Aluminum oxide was used to insolubilize (i.e. to lake) riboflavin 5'-phosphate (FMN) to improve the light stability of vitamin B₂. HPLC was used to determine adsorption percentage and light stabilities of laked FMN. The adsorption of FMN on aluminum oxide was very effective. An FMN content of 55% in lake was achievable, with adsorption of 91%. The adsorption isotherm was of the Langmuir class, and differed from the desorption isotherm. The stabilities of laked FMN at different light intensities and aw values were significantly (p = 0.05) higher than those of free FMN. AS

2577

Funk (MA) and Baker (DH). **Effect of fiber, protein source and time of feeding on methotrexate toxicity in rats.** *Journal of Nutrition* 121(10): 1991; 1673-1683

Fiber sources tested in these exp. had little effect on methotrexate (MTX) but the inclusion of soybean concentrate in the semi-purified diet totally alleviated MTX-induced toxicity symptoms. Also, the time during which diets are fed alters their potential to exacerbate or alleviate toxicity. Giving a soybean-based enteral product near the time of MTX dosing may minimize development of toxicity. BV

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

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